Vol. VII JANUARY, 1905 No. 1

THE AUTOMOBILE MAGAZINE

Price 25 Cents

Published by The Automobile Press, Angus Sinclair, Editor
136 Liberty St., New York

WORTHINGTON
AUTOMOBILE CO.

547 Fifth Avenue, New York

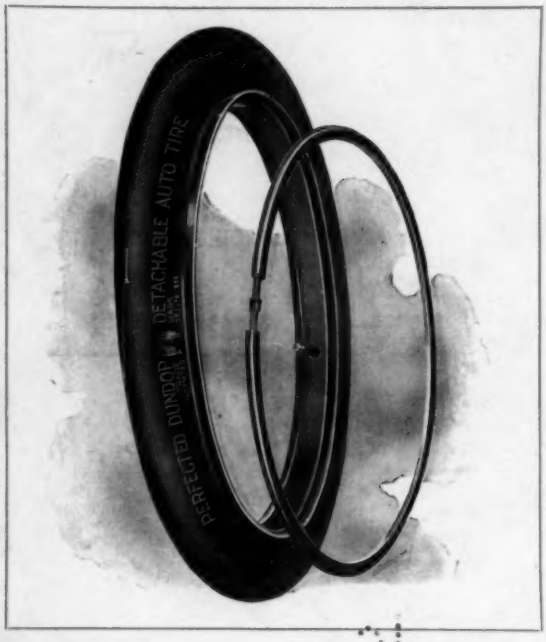
JAN 13 1905 PERIODICAL DIV.

WORTHINGTON "BOLLEE"

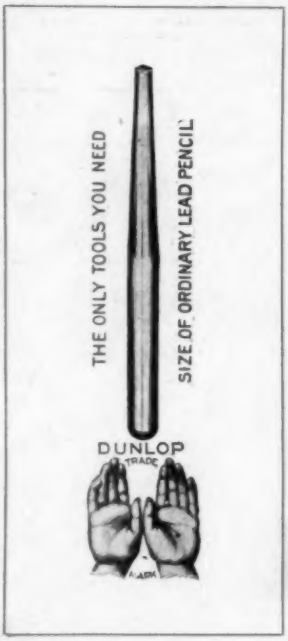
24 H. P.

TL1.A7

Hartford Perfected DUNLOP TIRE



Maximum for Speed, Comfort and Ease of Repairs



THE **Hartford Perfected Dunlop Tire** has been enabled to maintain its position as the standard by which other tires are judged, principally to the fact that "quality" has been the great consideration in its construction. Notwithstanding the advance in price of crude rubber, nothing but the very highest grade is used in the **Hartford Perfected Dunlop Tire.** This quality will be maintained under all circumstances.

Write us for "Proof of the Pudding" and you will find that the users of the **Hartford Perfected Dunlop Tire** give it their unqualified approval.

The Hartford Rubber Works Co.

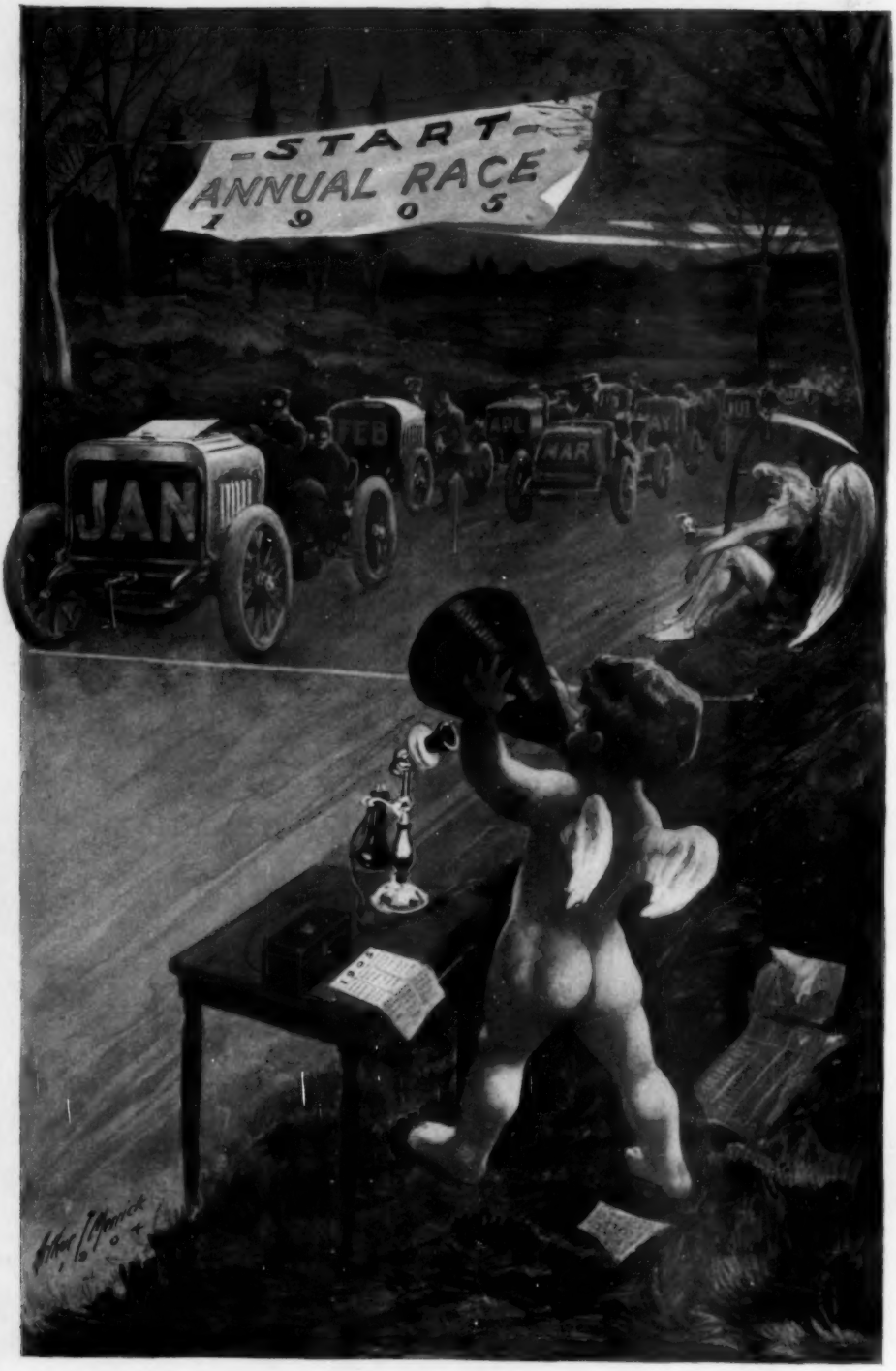
HARTFORD, CONN.

BOSTON NEW YORK PHILADELPHIA BUFFALO
CLEVELAND CHICAGO MINNEAPOLIS DENVER
DETROIT ST. LOUIS SAN FRANCISCO LOS ANGELES

1

LD4385
.T78 C
16

378
T8


-START-
ANNUAL RACE
1905
JAN
FEB
APL
MAR

LIBRARY of CONGRESS
Two Copies Received
JAN 12 1905
Copyright Entry
Dec. 29. 1904
CLASS A XXc. No.
84428
COPY B.

THE
AUTOMOBILE MAGAZINE

VOL. VII JANUARY, 1905 No. 1

Nineteen Hundred and Four in Review

By Robert Bruce

NO matter how closely you have followed the events of the past twelvemonth, one is almost startled as the realization comes that it is again time for a resume of another year's activity. The Editor's call for the usual review for his January number suggests a hundred directions of thought. As a matter of fact, automobile and motor boat events have followed each other with such rapidity throughout 1904 that we now look back over a closely crowded calendar. So full, indeed, is it that we wonder how a single year in the history of a comparatively new sport has held so much.

Since our last annual retrospect there have been tournaments of various kinds, national and international, a series of shows, and an almost entire reconstruction of the record tables, both road and track. All these, together with so many other items of interest and importance that the recorder is puzzled how to treat them all within the confines of a single prescribed article. If more pages are required for a review of the happenings of 1904 than have ever before been called for, it is due wholly to the marked expansion of the sport within the last twelve months. And even so, things that would have been considered of vital importance in previous years will either be omitted or scarcely touched upon.

Nineteen hundred and four opened officially with the Fourth Annual Show in Madison Square Garden, where, in the total of 185 spaces at their disposal, ninety manufacturers, United States agents or importers showed complete machines, and the rest the parts and accessories that enter into the construction or form the equipment of the automobile. In all there were 181 gasolene cars, 46 electric vehicles, 11 steam machines and a number of motor bicycles. All these vehicles, multiplied in number many times, are new no longer, for they have seen nearly a year of service. And now prospectuses and announcements of 1905 machines are appearing almost every day, while advance information of the different mid-winter exhibitions are reaching the public through a multitude of channels.

The National Show was not altogether before everyone "who's who" in automobiling went almost *en masse* to the Ormond-Daytona beaches, Florida, which saw the greatest gathering of the kind ever held in America, if not in the world. To mention but a few, there were such men as W. K. Vanderbilt, Jr.; H. L. Bowden, of Boston; S. B. Stevens, of Rome, N. Y.; Walter Christie, of New York; Louis S. Ross, of Boston; W. Gould Brokaw, of New York; B. M. Shanley, Jr., of Newark, N. J.; William Wallace, of Boston; Walter

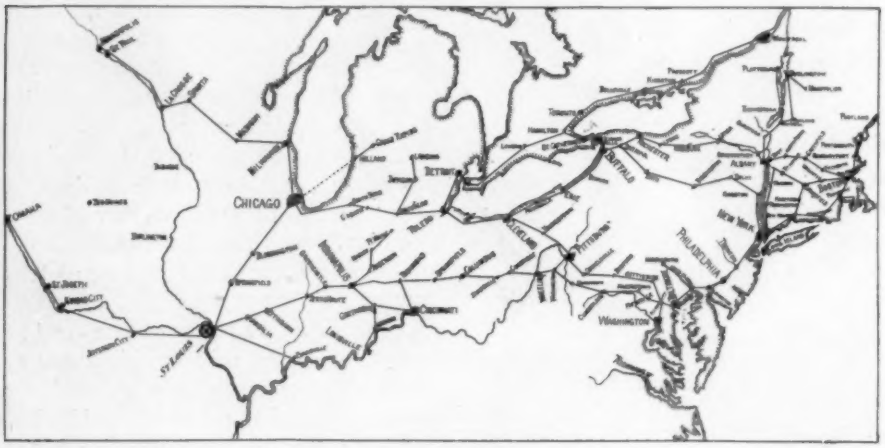
C. Baker and W. J. Hastings, of Cleveland, O.; Hugh Willoughby and James L. Breese, of New York.

These names stand for a great deal in business and society, as well as in the world of motoring, and it might be said that the records made, notable as they were, were something in the nature of a center for a royal good time in the full meaning of that word. As we are now on the eve of another Florida tournament, with the whole automobile fraternity guessing what times will be made less than a month after this appears in print, the following list of world's records established there less than a twelvemonth ago, is included for convenient reference:

*One kilometer, Chas. Basle, 60 H. P. Mercedes	0.20⅖
*One mile, W. K. Vanderbilt, Jr., 90 H. P. Mercedes	0.39
One mile, Barney Oldfield, 100 H. P. Winton	0.43
*One mile, L. S. Ross, 6 H. P. Stanley (Steam)	0.55⅘
*One mile, W. J. Hastings, Baker (Electric)	1.00⅗
Five miles, W. K. Vanderbilt, Jr., 90 H. P. Mercedes	3.31⅗
Ten miles, W. K. Vanderbilt, Jr., 90 H. P. Mercedes	6.50
Fifteen miles, H. L. Bowden, 60 H. P. Mercedes	10.18
Fifteen miles, M. G. Bernin (middle weight) 30 H. P. Renault	12.51⅘
Twenty miles, W. K. Vanderbilt, Jr., 90 H. P. Mercedes	17.02
Thirty miles, W. K. Vanderbilt, Jr., 90 H. P. Mercedes	24.11
Forty miles, W. K. Vanderbilt, Jr., 90 H. P. Mercedes	33.52⅖
Fifty miles, W. K. Vanderbilt, Jr., 90 H. P. Mercedes	40.49⅘

*Against time. All others were in competition.

Only a few days after the close of the Florida tournament the great gathering on the southern beaches had disbanded



"ALL ROADS LED TO ST. LOUIS" IN 1904

literally to the four corners of the country. A few had ventured to do some mid-winter touring in Cuba and Jamaica, others remaining in Florida for awhile. But by far the largest number turned northward at once for the Chicago, Cleveland, Buffalo, Washington, Boston and other shows that literally covered up the calendar until the outdoor season opened again, which was the first week in April.

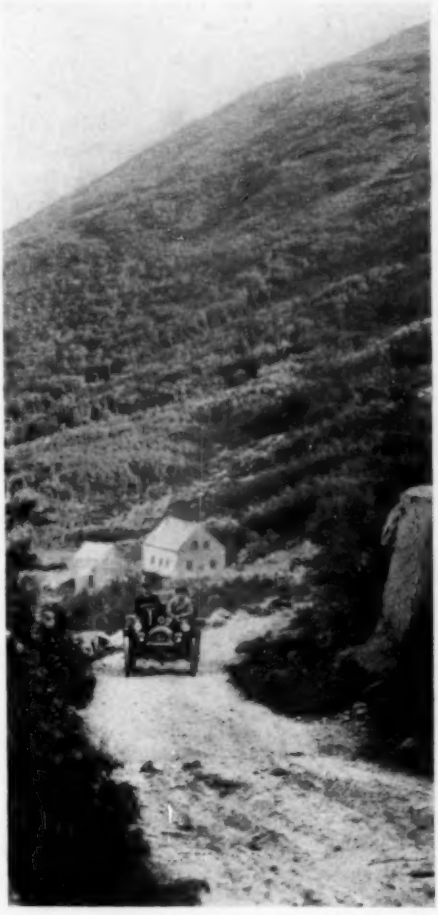
The six days beginning April 4 were set apart for the commercial vehicle tests under the auspices of the Automo-

bile Club of America. The range of weights and capacity were from the 500-pound gasolene delivery wagon to the 10,000-pound Fischer gasolene electric truck. Sixteen different routes were laid out from six-and-a-half to twenty miles, the express wagons (particularly) being given a schedule calling for from five to fifty stops, varying from the congested sections of the city to long runs to the far up-town districts and the East River suburbs.

Of the seventeen entries made, fifteen finished the contest, one having dropped out on account of not having been thoroughly overhauled on completion of manufacture, and another due to the carelessness of an employee. The rest of the machines finished in good condition, after having done a quality and total of work that no horse-drawn vehicle could have accomplished under similar circumstances. Many a "Doubting Thomas" was made to realize that a new era of commercial transportation had really been brought about.

Patriot's Day, April 19, was celebrated in Boston by the Second Annual Hill Climb up Commonwealth Avenue. Some five thousand people journeyed out by various means to the scene of the affair, where they simply lost themselves in enthusiasm over the jackrabbit-like jumps up the hill made by the competitors in the different classes. The little 2¼ H. P. National driven by C. H. Barney, reached the top in 1 m. 15⅗ s., tying with H. E. Marvel in the 3 H. P. Pope-Waverley. Louis S. Ross made the same climb in the Stanley steamer in 18⅗ sec. H. L. Bowden drove his 60 H. P. Mercedes to the top in 15⅘ sec., and H. B. Hills, Jr., negotiated the climb in 15⅘ sec. with his Georges Richard-Brasier. Running in another class from Mr. Ross but also in a Stanley Steamer, Mr. F. H. Marriott, Jr., made the top in 16⅗ sec.

Scarcely had the season opened when the unique project of a concerted series of tours to the World's Fair City was broached, and almost before snow was entirely off the ground tentative plans had been made to carry the most ambitious scheme of its kind to date into operation. History will give the credit for the idea and its carrying out very largely to Augustus Post of New York. Routes were laid out by the committee in charge from New York, Boston, Philadelphia, Pittsburg, Cincinnati, Chicago, Milwaukee, Kansas City and



Onward Toward the Clouds

points East and West to the World's Fair.

Barring the smaller number than it had been at first thought would participate, the affair was carried through practically on the lines laid down early in the summer. On St. Louis Day, August 10, there was a gathering of the columns on the East side of the Mississippi river, and the Exposition was moved upon by a procession of considerable numbers of motorists whose enthusiasm had not been dampened by the arduousness of their undertaking.

Naturally, the most interesting event of June was the 1904 Gordon-Bennett Race, run over a circuit of German roads in and around Saalburg. The circuit had to be covered four times, making the total distance of the race 348 miles. The winner was L. Thery, of the French team, who drove an 85 H. P. Richard-Brasier car the full distance in 5 h., 50 m., .03 s., thus averaging close to sixty miles per hour for each of the virtually six hours he was in the race. Germany came second and third, with M. Jenatzy, Mercedes, in 6 h., 1 m., 21 s., and Baron de Caters, Mercedes, in 6 h., 46 m., 31 s. Five times has the International Cup Race been won and three times has France been the winner, Great Britain and Germany having won once each. The history of automobiling in Europe is almost written in the summary of this contest which follows:

Year.	Winner.	Machine.	Course.	Distance, Miles.	Time. H.	M.	S.
1900	France, M. Charron	Panhard	Paris-Lyons	351½	9	09	00
1901	France, M. Giradot	Panhard	Paris-Bordeaux	348	9	00	00
1902	England, F. S. Edge	Napier	Paris-Innsbruck	383	10	00	00
1903	Germany, M Jenatzy	Mercedes	Irish-Circuit	368½	6	36	00
1904	France, M. Thery	Richard Brasier	Homburg Circuit	338	5	50	03

In this greatest of the world's International automobile contests six countries were represented, with a total of eighteen cars entered, making the victory of France all the more creditable and decisive. In all the countries where automobiling flourishes greatly America alone was not represented in the contest. The teams of eight nations originally were entered, but the withdrawal of the American and Swiss entries left as actual starters six teams, each with three contestants. The only American in the race was a Mr. Warden, who drove a Mercedes car on the Austrian team.

The 1905 Gordon-Bennett Race is already casting its shadows before, as nominations have been in order for some time and the trial lists will be closed by the time this appears in print. Nearly if not quite all the foreign cars are already entered. An amendment has been made to the rules of considerable possible importance to the American entries, whereby the cars entered will not be obliged to report their readiness to the race committee of the Automobile Club of America until May 1, 1905, instead of April 15 as previously ruled. However, the entrants will be obliged to make affidavit on or before May 1 to the effect that their cars have been completed for at least two weeks.

Changes of various kinds in the conditions of this event have already become a subject of discussion. Marquis De Dion is said to favor an increase of the distance to a thousand kilometers (621 miles) the change to include an additional day of racing with a change of drivers permitted. Working along the same line, the Industrial, Technical and Races Committee of the Automobile Club of Great Britain have made the following specific recommendations to the international conference assembling in Paris at this writing:

MISS VIRGINIA HARNED CHRISTENING THE NON STOP CAR
(At the Long Branch Tournament, August, 1904)

(1) That the course of the cup race should be extended from 500 to 1,000 kilometers (311 miles to 621 miles), since the former distance does not any longer, in view of the progress attained in the construction of motor cars, afford a satisfactory criterion. The cup would then be contested on two consecutive days over a distance of 500 kilometers on either day.

(2) That we (the A. C. of G. B.) do not support the principle of altering the Gordon-Bennett race into a team race, as it would destroy the personal sporting character of the event, and moreover, the Montagu Trophy already provides for a team race under Gordon-Bennett conditions.

(3) That the competitors should no longer be allowed an unlimited number of tires, but a fixed number of tires and inner tubes, stamped and registered.

(4) That the weight limit for 1906 be reduced to 600 kilogrammes (1,320 pounds).

Already they are discussing in France (where the race goes following Thery's win) the course over which the 1905 event will be run. However, the French Ardennes will in all probability be selected for both the elimination trials and the race itself. If any preliminary trials of the German aspirants are held they will probably take place over the Schleswig-Holstein route which was chosen for the May, 1904, trials, but was not used owing to the nomination of the Mercedes cars, without competitive trial, and the withdrawal of all but one of the other German cars.

July, 1904, will long be remembered as the date of the first annual Mt. Washington "Climb to the Clouds," and the new kind of tournament of which it was the central feature. This affair was so conspicuously a success that there is nothing at this time either in the United States or abroad to serve the purpose of comparison. There was the distinction of broken records, which effaced all

previous attempts on New England's greatest and most famous mountain. At the same time there was started a type of competition which cannot but increase in value and interest until all the famous drivers in this and other countries have found out the best they can do over the Mt. Washington course.

On Monday, the first day of the tournament, the climbing record was broken no less than five times, H. E. Rogers, Percy P. Pierce, A. E. Morrison, James L. Breese, and F. E. Stanley each holding the honor for a few moments—until the next man and car went up. At night the figure stood at 31 m., 41⅘ sec. to the credit of Mr. Stanley.

No sooner was Tuesday ushered in than a new assault was begun, Mr. Stanley making the best start and finishing his own record down to 28 m., 19⅘ sec. Then the whole course was cleared for Harry S. Harkness, who negotiated the climb with his 60 H. P. Mercedes in 24 m., 37⅘ sec., which time stands unchallenged to-day. In two days the time had been reduced to this point from the original ascent (August 31, 1899) of 2 h. 10 m. by Mr. and Mrs. F. O. Stanley. Nothing else during the year showed the might of the modern motor car so effectually as this single performance.

One month, lacking a single day, from the close of the Mt. Washington tournament, the principal scene of automobile display was shifted to the Jersey seacoast. In object, environment and character the two affairs differed widely. Each stood in its way for a type of entertainment, with the motor car as the central feature, best suited for its particular locality. Both were alike in making auspicious beginnings, of which future summers will bring out the full results.

During the week of August 15-20 an interesting and successful show was held in the West End Casino, Long Branch, N. J., while non-stop and track records that stand to-day were made, the former on the roads between Long Branch and Spring Lake, N. J., and the latter on Elkwood Park, near the old Monmouth Race Course. Especially noteworthy was the non-stop run planned by Mr. Sydney B. Bowman with the Clement-Bayard car, which had no difficulty in running 2,052 miles when it was stopped in order to save a life.

Different from all other trials of a non-stop character during the year, this performance was never for a moment questioned from any source. H. S. Harkness, with the same 60 H. P. Mercedes used at Mt. Washington, wiped out all of Henri Fournier's records made at Fort Erie on a Mors and finally made a new record for track competition of 1 h., 1 m., 50 s. for fifty miles.

According to custom the "show season" extends from the middle of January to about the last of March, the local ones following the national exhibit in Madison Square Garden, New York, and the Coliseum at Chicago. 1904 saw an altogether different kind of automobile show—that which formed a part of the World's Fair at St. Louis, covered in a more detailed way in THE AUTOMOBILE MAGAZINE for September. Perhaps a third of the American manufacturers, and about the same number of the importers of foreign machines, took space in the Transportation Building, and the different exhibits were kept in good shape until the close of the Fair December 1.

Under this one great roof were found every means of conveyance from the old-time stage coach and the first steam engine to the very latest contrivance in air-ships, automobiles, motor cycles and other wheeled vehicles. A total of 40,000 square feet of space was set apart nominally for the National Association of Automobile Manufacturers, although

"FAMILY TOURING" HAS BECOME VERY POPULAR IN AMERICA

the line between members and non-members was not allowed to cut as large a figure as was at first thought. Foreign exhibits of motor cars were made elsewhere in the Palace of Transportation and, in some cases, in the special buildings erected by the different foreign governments.

Taken all in all the showing of motor cars and their accessories at St. Louis was a creditable one, sure to redound to the benefit of the sport and trade, particularly in the mid-Continent and the great Southwest. Besides the formal exhibits, recognition of the automobile was given by the employment of a motor service between the thirteen sub-postal stations on the Exposition grounds. One of the figures adorning the outside of the Transportation Building was an automobile held in the hand of a heroic-sized figure—an unexpected and appreciated bit of forethought on the part of the sculptor.

Considered as a whole, the Exposition served a useful purpose. For obvious reasons its patronage came mainly from the central part of the country. Since the Columbian Exposition in Chicago eleven years ago a fresh generation has come to the front beyond the Alleghanies; and only a limited proportion of the elder element of the population there had the opportunity of attending the Pan-American. Hence, there was millions of intelligent people within a radius of a thousand miles of St. Louis who have their first experience of this kind within the last five or six months, and to whom it will long be memorable. They have been treated to impressive architectural effects unlike anything witnessed before, looked upon a great many mechanical marvels and displays that were pleasing revelations of human skill and ingenuity, and in the picturesque and strange sights of the foreign quarters have found a pleasure that could be otherwise derived only from a tour abroad.

So short has been the interval of time since the next proceeding world's fair was held that the one at St. Louis could hardly be expected to indicate any marked progress in civilization. However, the development of the automobile on present lines has taken place very largely within this time—at least in the United States. Wireless telegraphy is among the most recent scientific novelties, and by one of the inventors who has contributed to the development of that art an exhibit has been made this year which was instructive to the uninitiated. Another new feature was the series of aeronautic contests arranged. These have proved somewhat disappointing, in respect both to the length of the voyages made through the air and the standing of the contestants, but we believe that no such competition has occurred at any previous world's fair.

Automobile racing has been coming more nearly to its own in the United States, with a great deal of progress during the past year. Handicapped so far as road events are concerned by the unsuitableness of our highways and by the fact that the few available tracks in this country are widely separated and loosely affiliated, the racing spirit has continued to be somewhat circumscribed. However, the number of successful track meetings have notably increased, with a result that there has been an almost entire reconstruction of the record tables, which will shortly be announced officially for the year.

A triumph in itself was the W. K. Vanderbilt, Jr., road race, run on Long Island, October 8, this being the first long-distance road race, such as have been held in foreign countries for several years, that has been attempted in the United States. Its unquestioned success opened up new possibilities for the sport on this continent, and the fact that more than 50,000 people were strung along the thirty miles of the course from the beginning to the end of the race proves the presumed great popular interest in this sort of competition to be a fact.

The honors, as the world knew twelve hours or less after the contest went primarily to France through the winning of the event by Mr. George Heath, an American long resident in Paris. His machine was a 90 H. P. Panhard, the same one, in fact, with which he won the 1904 race over the Circuit des Ardennes. The average speed made by Heath from beginning to end was 52.2 miles per hour, the fifth lap (30.24 miles) being covered in 25 m. 13 s. (net) or at the rate of 67.8 miles per hour. Even one year ago this speed over any road course in the United States would probably have been considered impossible, especially in a contest of eighteen vehicles over a course literally packed with humanity.

The usual Thanksgiving Day Hill Climb, over a measured mile on Eagle Rock Hill, Orange, N. J., was won by M. G. Bernin, in W. Gould Brokaw's 60 H. P. Renault, beating W. K. Vanderbilt, Jr., (90 H. P. Mercedes) by the close margin of $\frac{3}{4}$ second. Bernin's time 1 m., 20 s., Vanderbilt's time 1 m., $20\frac{3}{4}$ sec. William Wallace, Boston, made the same climb in 1 m., 22 s., using his 90 H. P. F. I. A. T. and P. Sartori (also 90 H. P. F. I. A. T.) in 1m. $22\frac{1}{5}$s. Webb Jay (15 H. P. White Steamer) covered the same stubborn course in 1 m. $23\frac{3}{5}$ sec., about thirty other cars finishing. This is usually looked upon as the final outdoor auto event of the year in the East.

November always sees the annual election in the principal automobile organizations. On November 10 the Chicago Automobile Club, the pioneer and largest organization in the West, held its annual meeting, where a total

of four hundred votes were cast. Two tickets were in the field, and after a prolonged ballot the following results were had: President, John Farson; First Vice-President, Ira M. Cole; Second Vice-President, W. G. Lloyd; Secretary, Sidney S. Gorham; Treasurer, Charles L. Furey; Board of Directors: F. C. Donald, T. J. Hyman, B. H. Marshall, Robert Tarrant, Jr., Harold F. McCormick, Dr. Davis

On November 21 the annual election of the officers of the Automobile Club of America was held at the Club rooms, 753 Fifth avenue, New York. President Winthrop E. Scarritt retired after a conspicuously popular and successful administration of one year, his resignation being forced solely by the demands of his private business, and accepted with universal regret. He was succeeded by Dave Hennen Morris, in whose hands the responsibilities of the office will not suffer.

The other officers for the ensuing year, elected entirely without opposition, are as follows: First Vice-President, Colgate Hoyt; Second Vice-President, William K. Vanderbilt, Jr. (re-elected); Third Vice-President, Clarence Gray Dinsmore; Treasurer, Samuel H. Valentine. Governors to serve for three years: James L. Breese, Melville D. Chapman and Harlan D. Whipple. The membership of the Club is now 589, of whom 461 are active, 127 associate, and one life member, W. C. Temple, of Pittsburg, Pa.; gain in membership during the first official year, 165.

By the first of the year the governing boards of both these Clubs will be settled down to the considerable work ahead of them. The Chicago Club, by the way, has ceased its long fight against the numbering ordinance of the city of Chicago, and its members will hereafter carry license tags without further protest. At a previous meeting of the A. C. A. (at which time the nominations were made), a special committee consisting of A. R. Shattuck, Jefferson Seligman, Col. John Jacob Astor, William K. Vanderbilt, Jr., Arthur Iselin and Harlan W. Whipple were appointed to consider the matter of building a suitable club house and garage.

Trophies of the Most Notable Tour of the Year—Canada and Back—by James B. Dill and Winthrop E. Scarritt

It is generally agreed that both are needed to maintain the dignity of America's premier motor club. An endeavor is under way, backed by the prestige of the Club, for the passage of a State law compelling horse-drawn vehicles to carry lights after sunset, the same as automobiles. The annual banquet of the club will be held at the Waldorf-

Astoria on the evening of January 21, the night of the close of the Madison Square Garden show.

On November 2 the annual meeting of the Association of Licensed Automobile Manufacturers was held at the office of the Association in New York, at which time reports of the past year's business and surveys of the ensuing year's outlook were made. In addition, a new board of officers was elected as follows: President, Charles Clifton, George N. Pierce Company, Buffalo, N. Y.; Vice-President, W. E. Metzger, Cadillac Automobile Company, Detroit, Mich.; Treasurer, H. H. Franklin, H. H. Franklin Company, Syracuse, N. Y.; Secretary, L. H. Kittredge, Peerless Motor Car Company, Cleveland, Ohio. The Board of Directors (unchanged) now stands: Charles Clifton, F. L. Smith, E. H. Cutler, S. T. Davis, Jr., and M. J. Budlong.

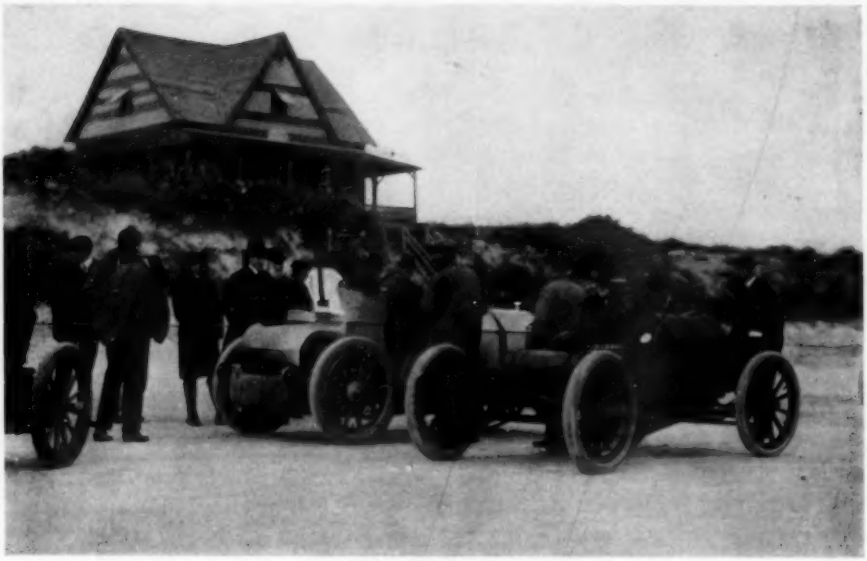
With the exception of the "Importers Show," practically the same series of exhibitions held last winter is now in prospect. In fact the first of the great shows is at this writing—mid-December—already on in the Grand Palais in Paris. It opened December 5 and is being held twenty days, closing on the 25th. The cable reports are very largely French, as the previous six have been, but with perhaps more than the usual number of visitors from other countries. Not a few American manufacturers and members of their official or technical staff have gone abroad to attend this greatest of all the Continental shows. Advance advices tell of a spectacular display of world-famous models in the way to touch the pride of the patriotic Frenchman.

As a matter of fact the foreign shows have been going on since October 14, at which time the German exhibition opened at Leipsic. Turin, Italy, is the location of the Italian show, which opens January 7 and closes January 22. Belgium's inning comes at Brussels January 14-24. Our own Madison Square Garden show (January 14-21) opens just a week after the opening of the Italian show and closes three days before Belgium's show, there being two weeks with three shows on the international program. As usual the Chicago show will follow closely the Ormond-Daytona tournament, the dates being February 4-11.

The last and most representative of all the world shows of automobiles and their accessories will be that at the Crystal Palace, London, England, February 10-18. This will be the most representative because it will draw all the leading manufacturers of the British Isles, while the principal French makers will cross the channel to display their newest productions to a people who are such good and regular customers of theirs. Besides, a number of the best American makes have agencies in England, and these, too, will be brought somewhat together, the whole giving a really international character to the exhibition.

Our New York and Chicago shows will be international, but not yet in so broad a sense. The Crystal Palace is the most suitable building for the purpose in Great Britain—1,608 feet long, 390 feet across the transept, and 175 feet high. As the name would imply, this building is of glass, and in clear weather the light is always good. The grounds are nearly 200 acres in extent, with splendid roads for short round trips by intending purchasers.

From February 21 to March 9 there will be held at Madison Square Garden a national motor boat show, under the auspices of the National Association of Engine and Boat Manufacturers. Owing to the rapid growth of motor boating in this country it is expected



ON ORMOND'S FAMOUS SANDS

that this exhibition will go far ahead of anything of its kind held up to this time. Following this there will be a few additional shows in Boston, Buffalo, Washington and other cities, with the result that the show season will be prolonged practically to the opening of the 1905 riding season. Surely the American public is to have ample opportunity to see for itself what the various manufacturers and importers are doing.

Now more than ever before the great problem is that of sufficient room. The show week of the American automobile industry has passed beyond the one-building stage for all time, and the problem of what to do for the future is as puzzling as ever, notwithstanding the Importers' Show at "Herald Square." The suggestion already made in THE AUTOMOBILE MAGAZINE that an autumn camp be planned, in which the show of well-forward models, which are growing in number, shall combine with a great outdoor function with unlimited space, may be brought about by sheer force of necessity. In respect to the proper times for a show, the continental trade (especially Germany) seems to have decided nearest to the logical basis.

Within another month or six weeks practically every American manufacturer who has not already done so will let the cat out of his particular bag, and a comprehensive view of the new types and models will be possible. Following its usual custom in this respect, THE AUTOMOBILE MAGAZINE will shortly publish a more detailed account of the family of 1904 machines than would be possible at this time. Though it will remain for the shows to tell the story in full, it is well known that progress in the construction of motor cars has been no less marked during 1904 than in previous years.

Looking back from the present viewpoint, 1895-99 might not improperly be called the era of preparatory organization, financial and mechanical, also of individual experiments. 1900 was devoted largely to laboratory and factory

experiments, and to gradually perfecting organization. The last four years, however, have been a period of active manufacture and public demonstration of the results achieved. Each year there has been increased success in adapting characteristic American forms of motors to new and original vehicle styles, according as the demand has broadened.

That the automobile industry has been signally benefitted by the gradual glending of foreign and domestic ideas is now widely apparent to anyone who is at all observing. The foreign influence has come to be less pronounced (and much less imitative) while, on the other hand the latest foreign developments are influenced by the progress of American construction nearly if not quite as much as our designs have been modified by trans-atlantic patterns.

How far the tide has turned is fairly well indexed by the remark made by Sir Alfred Harmsworth, of London, during his recent visit to the United States, to the effect that after seeing what had been done to perfect and popularize the automobile in America, he was surprised that any foreign-made vehicle of that type should be imported into the United States. This recalls the fact that at the recent meeting of a British association of carriage manufacturers the chairman of the organization frankly declared that the English export trade in carriages had almost entirely disappeared. The development of the American vehicles for road use has been distinctly logical.

The roads of the United States until a few years ago were distinctly bad, and are none too good now. The American maker, therefore, was required to produce wagons and carriages which, first of all, had to endure a vast amount of wear and tear. Having done that, his next task was to combine lightness with strength, eliminating all needless weight but without sacrificing the smallest degree of durability.

In the vehicles thus evolved, adapted as far as possible to the poor roads of the United States, the keen-eyed British colonist found precisely what he needed for service in the regions whose physical conditions were relatively the same. There is the secret of the steady demand for American vehicles in the British colonies. It is expressed in two words: merit, adaptability. Sir Alfred Harmsworth's remark as to the development of the automobile in the United States was amply warranted by the facts. The manufacture of motor vehicles in America is still young, but its growth is rapid and increasing, and it has already confidently entered the export field.

That American-made automobiles are destined to share in foreign countries the high repute so fairly earned by American carriages and wagons seems to admit of no doubt whatever. Up to this time, however, France is a larger exporter of automobiles than any other country. For the first eight months of 1904 (later figures not yet available) France's exports were valued at $9,235,200, an increase of $2,600,000 over the corresponding period of 1903.

The motor boat is destined to a decided popularity and use in the very near future, for by it, as in no other way, can the greatest amount of benefit be derived in the shortest space of time on the water. The American Power Boat Association has done remarkably well since it was founded less than two years ago. A number of regattas have been held by clubs having membership in the Association, with no lack of splendid competitions during the open season of 1904. Applications for membership in the Association have been received from even unexpected quarters, and the Marine Motor Association of Great Britain

POWER BOATS GROW IN POPULARITY

has paid the American body the compliment of adopting its table of time allowances.

Undoubtedly the most interesting motor boat contest of the year was a long-distance race from New York city to Poughkeepsie, N. Y., and return, a total round trip of 136.6 statute miles. This event was arranged by the officials of the American Power Boat Association in co-operation with the Columbia Yacht Club, and the operators of the speediest motor boats in American waters. For a race of this length, a small entry list was expected, and three boats were ready to start as follows:

Name. Helmsman. Rating.
Challenger, A. D. Proctor Smith. .88.35
XPDNC, Frank Croker.....79.70
Vingt-et-Un II, Clinton H. Crane.79.35

The result was the notable triumph for the XPDNC and its driver, Frank Croker, the turn under the Poughkeepsie bridge being made in the time of 2:30:50 from West Eighty-sixth street, New York, figuring out an average speed of 27.17 statute miles. The XPDNC made the down trip in 2:41:00 flat, an average of 25.45 miles. The total elapsed time of the winner was 5:11:50, or the average of 26.29 statute miles per hour. When it is considered that few trains on the New York Central Railroad make the run to Poughkeepsie and return under four hours, it will be seen what a splendid performance the winning helmsman made with his motor boat.

Of the other two entries the Challenger was disabled on the lower half of the trip, its propeller engaging a floating log. The Vingt-et-Un II completed the course after various unexpected delays, making an average of 22.15 statute miles per hour. Considering the distance covered, this time would have been looked upon as a good performance except for the phenomenal speed made by the winning boat.

1905 is sure to see a very large increase in the number of motor boats on American waters; and it would not be surprising if motor boat tournaments were to become fully as popular as automobile tournaments in the near future. Especially as the waters of the country are "public" in a sense that the

roads and tracks are not. Indeed, so severe are the restrictions upon the use of roads and tracks, and so great the responsibilities of their use, that even the strongest clubs, associations and promoters are bound to hesitate before giving their official sanction to more than a few land events, while the waters are "free" under a few very broad principles.

It would be impossible to dismiss the subject of automobile progress during 1904 without referring, even if briefly, to the growth in touring interest during the closing year. It would almost seem to the impartial observer that touring by motor car had witnessed an increase of at least fifty per cent. in the past twelve months; at least the area of country traversed has been so greatly enlarged that the old limitations have entirely disappeared. A few years ago a trip even two hundred miles long was something to be carefully regarded and given general publicity. But to-day trans-Continental trips have almost lost their novelty. Only such unique tours as the one made by James B. Dill, the past summer—from New York to Saratoga, through the Lake George country and over the Canadian border to Montreal, thence to Quebec, into the Rangeley (Maine) district and home by the way of Portland—have more than a passing interest for the great army of tourists.

To-day at least half the continent has been mastered by the motor car. On the eastern coast, from the Penobscot to the James, westward from Lake Champlain to Lake Michigan, southward from the Straits of Mackinac, the Rivers Ottawa and St. Lawrence, to the Potomac and the Ohio, is the most historical as well as the most popular section of the continent, with the largest proportion of good roads. Eastward and northeastward is New England with its wealth of historical and literary associations, where the original Yankee still survives. Within the radius of two or three days' automobiling from New York or Philadelphia are the Green and White Mountains, the Berkshire Hills, the lake region of New Hampshire and a cordon of sparkling isles extending all the way from northern Maine to Long Island Sound.

Northward is the Adirondack Mountain region—many of whose peaks are reflected by the placid waters of Lake Champlain and Lake George—where the trout still hide and nature is yet unsubdued. Short trips only are possible in this district now, but better things are already on the way. Still farther north is the most interesting of the British possessions on the American continent, the Province of Quebec, where the tourist who is willing to put up with the trouble and expense of taking his machine to Canada and back again, may forget that he is on the Western Hemisphere and as easily imagine himself in a foreign land.

Westward within the same radius will be found Central and Western New York State, the former with the Mohawk, Susquehanna and Chenango Valleys, so closely entwined with the fading history of the Six Nations; the latter sprinkled with lakes that all summer long are alive with pleasure craft. This territory contains many thrifty cities and hundreds of miles of good roads (other hundreds of miles of bad roads) running through some of the finest agricultural lands of the East. Lake Ontario, Niagara Falls and portions of Lake Erie and the Provinces of New Brunswick and Nova Scotia we must also include with other attractions too numerous to mention.

Lower New York State, northern New Jersey and northwestern Pennsylvania, portions of Delaware and east-

UP CORY'S FAMOUS HILL

ern Maryland are all easily accessible, with the Ramapo Hills of New Jersey, the Pocono Mountains of Pennsylvania, Delaware Water Gap, the West Hudson River country, Richfield Springs, Lebanon Springs, Watkins Glen and a host of other resorts. This entire region is within comparatively easy access by road from New York, Boston, Philadelphia, Washington, Pittsburg, Buffalo, Cleveland, Detroit, Toronto and Montreal.

Sometime in the future we shall think no more of an automobile trip from any one of these cities to popular resorts like Saratoga, Atlantic City, the Maine coast, or far out on Long Island, than we now think of the same journey by rail. It is principally a matter of improving roads, in which respect progress is recorded almost daily.

Excepting the National Shows which are, of course, an all-trade affair, and therefore in a class by themselves, if one were to ask what were the conspicuously unique and successful events of 1904, he might very properly answer the Ormond-Daytona tournament in January, the Mt. Washington climb in July, and the Long Branch tournament, with its new world's records on Elkwood Park, in August. It is perhaps only just to call attention to the fact that these three events were promoted from the office and by the representatives of THE AUTOMOBILE MAGAZINE, each one of the three being carried through to success without a single accident happening in any one of them.

Surely no one will deny that THE AUTOMOBILE MAGAZINE has been active during the whole year in promoting the best interests of the automobile sport in the United States. In addition to personal services involved, the publicity given to the sport has been, in the opinion of many conservative judges, one of the chief factors in the growth and popularity of automobiling during the year.

Be Slow to Change

Where cars are equipped with epicycloidal change speed gearing users should be sure to change the gears carefully. As a matter of fact, the driver of little experience who has never used anything but sliding gear changing is, for a short time, completely out of it when he is placed in a car equipped with epicycloidal gears, since with the sliding gear a quick motion is necessary for gear changing, while with the other type a gradual feeling action for the change is demanded. Thus, on

cars employing epicyclic gears, the driver should be careful to apply the lever which changes the gear as gradually as possible, otherwise the strain on the gear is very considerable and stripping is by no means a remote possibility. Lubrication of the drums is advisable, and is usually provided for, but if not, the driver of the car should see that some thin oil is used to occasionally grease the peripheries of the various speed changing brake drums to avoid this particular trouble.

Is This the Auto Age?

"Oh," she said, "I had such a terrible dream last night. It seemed that I had suddenly been deprived somehow of the power to move. All my limbs were paralyzed, and I lay right in the path of a great big racing automobile that I could see coming toward me at a terrible rate of speed, with the lamps at the sides blazing like the eyes of some terrible monster. Nearer and nearer it came, and I, in fearful agony, tried to drag myself out of its way, but was unable to move. I tried to cry out, so that the man who was running the automobile might either stop or turn aside and avoid running over me, but I could not make a sound. On, on it came, as if imbued with life and in fury of frenzy. I had just given myself up for lost when——"

"Yes," he interrupted, "then you woke up. But that isn't the important part of it. By your experience we know that the horseless nightmare has arrived."

Straining of Gasolene

No matter what you may think or may have heard to the contrary, wisdom demands that before being poured into the tank all gasolene should be passed through an efficient strainer. If this is not done sooner or later, usually the former, the gauze strainer through which the gasolene passes before reaching the float chamber becomes choked, and an irregular supply to the nipple follows, with consequent irregular working. The use of a piece of fine old muslin in addition to the gauze of the funnel used for filling is recommended, and if the muslin is, before the first time of using, well scoured by passing some gasolene through it, all lint is removed, and perfectly filtered gasolene only passes through, with the result that you'll have less cause for complaint.

The Damaged Scorcher's Farewell

My palpitating speedy steed, no more with thee I roam.
They bear me in an ambulance to take the train for home.
For others fly in clouds of dust with all thy winged speed,
I will not mount on thee again— We part, my pungent steed.

No more upon pneumatic tire we'll rush the crowded street,
Through streams of loud anathemas too lurid to repeat,
No more we'll scare the country lane and dust the breezy wind,
And leave the Reuben who protests a happy league behind.

I blame thee not for graceless form or hideous design,
Thy stormy petrol spirit needs a stouter curb than mine.
Thy brake and cylinder were false—too late I know and feel
There lurks a demon heart within that throbbing breast of steel.

I leave thee, snorting, panting fiend; with curses loud and deep,
Thy farmyard victims will not rise and haunt me in my sleep,
But when I'm tired of life and wish from this vain world to flee,
I'd rather take the stately hearse than speed again with thee.

Woman as a Chauffeur

By "The Tradesman"

I AM not in automobiling for my health. Originally I was, the doctors having told me that the fresh air, excitement, etc., of running a motor car might prevent a nervous collapse with which I was threatened. For once the doctors were right. I took to automobiling and it cured me. To-day I am in automobiling with the idea of curing some others if they will buy their cure-alls from me. Brutally I am in the business for what there is in it for me—I am an automobile dealer. It is not a confession I make with any great amount of pride—nor profit either, if the truth must be told, but one needs must when the devil drives, eh?

Enough of myself; now for my customers. "Of women there is no general statement that is true," says Marion Crawford. After having spent a lot of time in teaching women how to run automobiles I say the same thing. In automobiling woman has a fine chance to show her infinite variety, and she makes the most of it.

I know that Mr. Crawford is right. Motor carriages have become so common in the last year or so that there has been a tremendous increase in the number of women who run them, and also in the number who have a practical knowledge of the machinery which drives their cars. This applies to the very wealthy and to the moderately well off alike, to women of leisure and to business women.

Nowadays the fashionable New York woman may know little or nothing about needlework. She may have had no time to learn the art, but some of the daintiest fingers in town are well acquainted with an oil can and have learned to clean a clogged up spark plug and even to make minor repairs as handily as a professional chauffeur can. What is more, they seem to like the work.

When automobiles first came out, few others than very rich women showed much interest in them, and they for the most part were women who had been accustomed all their life to drive, ride, wheel and all that sort of thing. Most other women were chary even about sitting in a motor car, let alone handling the wheel in one of them.

But, of course, that state of things didn't last long. For one thing, less expensive grades of cars soon got into the market, most of them simple enough for a woman to manage. Some women who couldn't own both gave up horses and took to automobiles, and many more who never before owned a conveyance of any kind planned to get a motored one.

To-day among business women the automobile has a great vogue, and near-

ly every such owner has learned to take care of the machine herself as well as operate it. One, I know, who owns three restaurants in different parts of the town, makes her rounds in a gasolene automobile which she looks after entirely herself, except when there is a break which absolutely demands a skilled mechanic. She told me, in fact, that she felt better satisfied to keep the car cleaned and cared for herself.

"Then I am perfectly sure it is done," said she, "and I know that I won't have an accident from lack of those precautions before the day is over."

Another of my woman customers owns an iron foundry in New Jersey, and she goes over there every day to look after things, traveling in an electric runabout, which she takes care of herself—does it well, too, but not a bit better than some fashionables I know of. The business woman may have more self reliance, perhaps more staying qualities than the fashionable woman, but when it comes to taking care of an automobile she can't beat her sister of the millions.

There are now hundreds of women in New York who own automobiles, but do not keep chauffeurs. Some can't afford to. Others don't want them—have no need for them, except when something out of the common happens, when of course they call in an expert and let him attend to it.

I am really surprised at the knowledge of some of the women who have come in to my place of late with husband or friend to look at machines. Why, many a time they are quicker to appreciate the good points of the most complicated parts of the motor or transmission than the man, whereas not long ago under the same circumstances a woman could only look on.

There are some things which it is impossible to teach, and nerve is one of them. For this reason there are women whom it is impossible to teach to operate an automobile successfully over a fairly populous thoroughfare. For instance, last summer at a seashore resort not far away, I myself went down to give instructions to a lady who had bought a runabout from me. It was a pretty little car, and I know she had expected to cut quite a dash with it on the splendid drives surrounding the place. Even while I was teaching her she never wanted to go into a quieter avenue, and I could hear her making engagements right and left to take one and another of her friends out for a ride. Of course, I said nothing, but I kept up a hard thinking. The fact was the woman had a fair share of self-confidence, and she got along beautifully when the course where we were covering was comparatively clear; but the minute the unexpected turned up, like a wagon trying to cross in front of her or a fast moving team coming up from behind, invariably she lost nerve and turned the wheel the wrong way. It was just the same the day I left her as it was when I started in, and I heard afterward that she got into so many smash-ups no one would ride with her, and eventually her husband forbade her trying to drive the car on the main street at all. This trick of turning in the wrong direction at the first sign of danger is much more common to woman than it is with men. For that reason I never, when driving a car myself, if I can help it, sound my horn when I see a woman trying to cross on foot in front of me. Let her alone, and ten chances to one she will scud across safely without my even having to slow up; but blow the horn and she hesitates, gets confused, goes nearly all the way across and then often turns back again and deliberately puts herself right in front of the machine.

Many women I have taught were like

that at first, but got completely over it with experience. Others never got over it. On the other hand I have known a few women drivers so venturesome, so foolhardy, that it made me shiver to think of sitting alongside of them. One of this kind bought a big car of me last winter and asked for instructions how to run it. Or rather she said she wanted a chauffeur to go along with her five or six times, just by way of precaution. She had ridden so very often with friends that she was quite sure she could get on without any help. I afterward learned that her father insisted she should take a chauffeur along at least six times before attempting to manage the automobile alone. Only for that, goodness knows what would have happened. The first man I sent went out with her came back in two hours looking as if he had seen a ghost, and the next day he flatly refused to repeat the experience. The other chauffeurs here jeered at him, but he stuck to his determination and another man took his place. He, in turn, firmly declined going again. It was the same with four different chauffeurs; and finally when the supply gave out I had to step in and finish up with her. What was the matter? Why simply this. That woman would not let the wheel out of her own hands a second unless it was almost taken by force, and she insisted on going along at top speed no matter how crowded the street was. She was utterly reckless and seemed to think that everybody would give her the right of way.

A good rule, indeed, a necessary rule for beginners, is to keep at least four feet of space between you and the vehicle in front of yours; but nothing would keep the woman I speak of from hanging on as close as she could to everything in her way. Heavens! how the owners used to glare at us—do more than glare sometimes. The whole of my garage grinned the day I took her out, and remarked privately that they saw my finish. Instead of that, I am sure I came back looking as cool as ever while the lady beside me was unmistakably subdued. How I managed her was simple enough: I threatened to tell her father she was not fit to be trusted to operate an automobile even with an instructor along. At any rate I succeeded in doing what none of the chauffeurs could do—made her run the machine according to his orders.

An Example of the Expert Woman Chauffeur.—Miss Netta M Brown, who drove a Union from Ohio to Colorado without assistance from anyone.

No, I don't have many pupils like that, thank goodness. Of late I think nine out of every ten women who decide to run an automobile want to learn something about its construction; and they do learn—learn just as quickly and intelligently as most men. I am sur-

prised every day to see the mechanical bent of the daintiest women in this direction. I had two pupils this winter who learned how to keep a car in good working order, for no other reason than to have it ready for their husbands when they came up town in the afternoon. Neither women, strange to say, had the courage to run the car herself, although each of them knew how, well enough.

Most women, though, want the fun of running a car as well as keeping it in order. One woman who keeps her gasolene car at my place never lets any one touch it except herself. So far there has not been a thing happen to this car which needed a workman to remedy it, and yet the woman who owns it has run the machine nearly a year. Every day when she comes in to overlook the car she puts on a pair of overalls just like a man, only that they are made much wider, and gets down flat on the floor under the car. Then she goes to work, examines every connection critically and cleans and polishes until everything is as spick and span as it can be made. And yet to look at the woman one wouldn't expect it of her. She is a pronounced blonde in type, dainty in coloring and is always got up in the latest fashions. Most of her knowledge about automobiles she got from books. After learning how to operate the one she bought she seemed to have no more use for a chauffeur. Instead of asking help of any one, she got a book of instructions and began studying on her own account, sitting around the car, book in hand. At first we laughed among ourselves to see her, but we long ago stopped that. I found out the other day that she knows how to manage a steam and an electric just as well as her own, which is saying a good deal.

Just now there is something more than the usual demand by women for instruction, for the reason that many take with them into the country in the summer a small automobile, and in out-of-the-way places there is not likely to be a chauffeur or a mechanic within close call and the ordinary man-of-all-work about a small cottage may be all very well to help with a broken down carriage or harness, but he is usually worse than useless to tackle a damaged automobile. Owners know this. Consequently women are equipping themselves so as to be perfectly independent by having me instruct them now before they will want to handle the car.

Some Boys Are So Dull

"I propose," said the ambitious young man whose father had just presented him with a big touring car, "to girdle the earth."

"Oh," she innocently exclaimed, "why do you begin on such a big thing?"

But he only sat there and just twirled his cap, fat-head that he was.

What a Storage Battery Really Is

By Charles L. Corson

THE I-press-the-button-and-the-battery-does-the-rest is an idea which is entirely too prevalent among automobilists generally, when it comes to the use and abuse of the all important battery. A little time and study given to the acquiring of at least a rudimentary understanding of just what the storage battery is supposed to do and why, would save most drivers many, to them, mysterious "break-downs."

To begin with, there never was a bigger mistake than to suppose that a secondary battery actually stores electricity. This is not the case. The facts are that a storage battery contains only metal plates and acid which, by means of a current or "charge" from some outside source, can be so changed that they become capable, owing to their chemical condition, of themselves creating a flow of electricity when the circuit is closed.

The only materials which have so far proved suitable for the plates in a secondary battery are lead and lead peroxide (or, rather, lead coated with lead peroxide). It may seem strange that these should answer the purpose, since they are both made from the same metal. But, although this is so, they are very unlike. When you remember that rust is an oxide of iron, and think how different a polished iron plate is from one thoroughly eaten by rust, you can readily see how this may be so. In a charged accumulator the lead plates are a dull gray, the peroxide plates brown. When the cell is discharged all the plates become much the same color, so this gives one a means of telling at sight whether an accumulator is charged or not.

These plates of lead and lead peroxide are placed in a solution of sulphuric acid of a certain strength. These are arranged so that every peroxide plate—which we will call positive—has a lead plate—which we will call negative—on either side of it. All the positive plates in each cell are connected together and to one terminal, and the negative plates in the same way to the other. As this is so, one may for most purposes think of the cell as if it were made up of two plates only—one positive and the other negative.

When the primary circuit of the ignition system is connected up and the current flows, the two plates combine with the sulphuric acid and gradually get coated with lead sulphate. When they are both in this state there is no reason why the current should flow one way any more than the other; and, consequently, the cell ceases to give a current—it is discharged, or "run down."

Now you come to the point where the accumulator has an advantage over an ordinary primary battery, consisting of, say, dry cells. You have only to get any source of direct current electricity—alternating current will not do—and, by sending a flow through the cell "backwards," you can change the plates back into their old state—lead and lead peroxide—and they are ready to begin work again.

The plates of most cells are made of a sort of honeycomb of lead, with the holes filled up by pellets made of a paste of red lead mixed with sulphuric acid. They are thoroughly charged before being connected up to the coil.

An accumulator may be damaged in many ways other than by actual

violence, so perhaps it might be just as well to consider what these are, and why they should affect the plates as they do.

First of all, the cells may be "short-circuited" by connecting their terminals together by a short thick wire; an ammeter with short leading wires will have the same effect. This is just as if you connected two water tanks at a different level by a very large pipe, the result of which will, of course, be to cause a very large current to flow. The pellets in the honeycombed plates will expand quickly under the sudden strain put upon them, pushing the soft lead before them. When the cell is at rest the pellets will contract again, but the lead, having no "springiness," will not contract with them. The pellets will then get loose in the holes, and, after a time, will fall out. This, of course, will make the plates less efficient, and there is a good chance that sooner or later, the pellets, falling between the plates, will touch two of them. This would form a "short circuit" inside the cell. Most of the current would then flow, and, as this would go on even when the motor was not at work, very little would ever go through the outside circuit where it is wanted.

Another quite common way of damaging accumulators is to discharge them until they are absolutely run down. This is very frequently done, and is a great mistake. It does not do to wait until the spark becomes feeble, or fails altogether, before recharging. The reason for this is that the latter part of the discharge is very lekely to partially coat the plates with a white compound which refuses to conduct electricity, and is exceedingly difficult to remove. When this happens, the plates virtually become smaller, since a part of them is of no use. Consequently, after the next charge they do not hold out so long, and the "run down" probably occurs again. Besides the obvious inconvenience of this, there is the unpleasant knowledge that the car is carrying a quantity of lead which is acting only as a "dead weight."

This condition of affairs can always be avoided by the proper use of a voltmeter, or a four-volt lamp, and by always taking care to recharge, if anything, before it seems necessary. This will entail no waste, whereas an accumulator which has been run down badly ought really to be given two or more "chargings" before being used again.

Always remember that if an accumulator is to remain idle for some time it should invariably be left fully charged. The action during discharge is to form sulphate at the expense of the acid. Now, when a cell is at rest, it usually happens that different parts of the same plate act on one another as if they were two separate plates. This is called "local action," and its usual effect is to form lead sulphate in just the same way as the battery itself does during discharge. But if the solution has got weak the objectionable non-conducting compound referred to above appears instead, and inevitable damage ensues.

Sometimes, if an accumulator is constantly ill-used in one of the ways described above, the plates will get so distorted and buckled that they will actually bend so far as to touch one another, and so cause an internal "short circuit." There is then no real remedy except new plates. As a general thing, when a cell is not up to just what it should be it can be much improved by overcharging. By this is meant that it should be charged not only once, but for several hours

daily for three or four days. During this time there is no reason why it should not be used to some extent, but the point is that you must go on putting into it far more than you take out of it. When the cell is being charged there are several things to remember: First, the positive pole of the accumulator must be connected to the positive pole of the supply.

The storage battery usually consists in reality of two cells, each giving about 2.1 volts. When these are connected up "in series," as they always are in the cases with which we are concerned, the result will be a working voltage of $2.1 \times 2 = 4.2$; but when the cell is fully charged it may almost reach five volts. The voltage of the charging current must then never be less than five volts. Accumulators can always be very conveniently charged from direct current lighting mains, but, as the conditions vary according to the voltage of the supply, we cannot deal fully with the matter here. If the owner has a very limited knowledge of electrical matters he would be wise to get an electrician to arrange the thing for him at first; and, subsequently, he may be able to manage without further help. With regard to alternating current supply, it is evident that this would be of no use, as the current in this case keeps on changing in direction, and at one moment would be charging the cell, at another moment discharging it. It is possible to change or "transform" an alternating current so that it could be utilized, but the expense would be so great that no amateur would ever find it worth his while to consider this.

Primary batteries for charging purposes have been so often and so fully described that I need not trouble about them here. While charging, the voltage will probably remain nearly steady at a little over four volts for some length of time, but if you want the cells to carry you the maximum distance you must wait for the last rise which will be fairly sudden, and will, as I have said, reach something like five volts if the cells are in really good condition. During this time the voltage may be found at intervals by means of a voltmeter—a four-volt testing lamp will be of little or no use for the purpose—and when the charge is quite complete the acid in the cells begins to bubble or "boil," whereupon the voltage at once refuses to rise any further. However, it will do no harm to the cell if it is left under charge still longer, so that there is no need to give it constant attention. You can at any time connect up a voltmeter across the terminals of a battery, as it contains a long coil of thin wire offering a great resistance to the current, and so can do no harm. An ammeter, however, is different. Its function is to measure current, or "ampères." The whole current to be measured must, then, pass through the instrument. On this account its coil is made of a short thick wire. If the terminals were connected up through this the cell would be practically short circuited, with the effects referred to above.

When a discharged cell is left standing it will sometimes appear to recharge itself to some extent. This is called "recuperation," and is caused by the "local action" which I have already mentioned. It is not well to take too much advantage of this; in fact, the voltage of a cell should never be allowed to go much below 3.8, particularly if it is to remain so for any length of time.

In spite of all I have said, a cell

will sometimes stand ill treatment wonderfully, but you can never rely upon it to do so.

The outsides of cells should be kept as dry as possible, as a film of moisture—especially if it is acid—connecting the terminals will conduct electricity, and the accumulator will run itself down. Sometimes when a cell is left idle for some time the acid may creep up the "lugs" connecting the plates to the terminals, and not only corrode the latter but even eat through the connections. This action of the acid on brass or copper can be prevented by a good coat of vaseline, or of candle-grease.

How Valves Should Be Ground

In order to re-establish the compression when the valves are found to be defective, the valves should be reseated by grinding with the aid of oil and flour emery. Great care should be exercised in doing this. Advice is sometimes given to make a paste of our emery and oil, to place this on the angular face of the valve and then, replacing the valve stem in its guide, to begin grinding operations. This treatment is altogether too drastic, unless it be resorted to only when a valve is in such a bad condition as almost necessitate its being refaced in the lathe. A far better method is to lubricate the face of the valve, and then, dipping an oily finger into the flour emery, transfer as much of the abrasive material as adheres to the finger to the face of the valve. This provides quite sufficient emery to begin operations with.

The valve should be turned on its seat —by the use of a screwdriver or a special tool provided by the makers—either with a circular or half-circular motion, light pressure being brought to bear upon it at the same time. At frequent intervals the valve should be lifted from its seat to prevent any hard particles which may possibly be in the emery from causing rings to be cut on the face of the valve and its seat. It will always be found after lifting the valve that a new cut is on the emery, and this will gradually wear away until it appears to have lost its cutting edge, but the lifting of the valve will again prove that this is not the case.

During the whole of the grinding in operations plenty of oil should be used, and when the condition of the valve face and its seat is perfect (this being indicated by a bright and equal surface extending over the whole face of the valve) the seat of the valve itself should be well washed with gasolene, great care being taken that no particles of emery are washed into the cylinder. If this should happen, it is very possible that the piston and the cylinder will become badly cut by such emery, and the foundation will be laid of a lot of trouble, and there will be a permanent loss of power through insufficient compression.

Notable Road Events of 1904

By "The Recorder"

AUTOMOBILING in America has now closed its most notable year, both on the road and track. Scarcely any of the left-over records of 1903 are now standing, and in almost every case the cut has been so deep that the corresponding ones of a year ago are scarcely in the comparison. This is more true, naturally, of road records than of track performances.

First, the trans-continental record: It is a somewhat remarkable thing that there were three trans-continental trips by motor cars in 1903 and by one motor cycle. In 1904 there was but one attempt to make a new record over the San Francisco-New York course and this resulted in cutting the best previous record just about in half. Referring to the records of 1903, one finds that George A. Wyman left San Francisco on the afternoon of May 16, 1903, and reached New York on the afternoon of July 6, having made the trip in fifty days' elapsed time, with an actual riding time of thirty-nine days. His is the distinction of having been the first person to cross the continent on a motor-driven vehicle of any sort. The second party to make the journey was Dr. H. Nelson Jackson, of Burlington, Vermont, accompanied by Sewall J. Crocker. They started May 23, and reached New York July 26, sixty-three days out, of which forty-five days were spent in travel and eighteen days were the sum of delays along the way.

Then followed the best equipped of the 1903 trans-continentalists, a party of two, consisting of E. Tom Fetch, operator, and M. C. Krarup as passenger and observer. They left the Cliff House, San Francisco, on Saturday, June 20, arriving in New York, August 21, 1903, sixty-one days out. The fourth and last expedition was the Oldsmobile runabout party, L. L. Whitman and E. I. Hammond, of Southern California. They started from San Francisco July 6th, carrying a letter from Mayor Schmitz, of that city, to Mayor Low, of New York. They reached the metropolis September 17, and on the following day, after delivering their "official" message, extended their trip to Portland, Me.

"As we tour through life let's live by the way"—White Bulletin Philosophy

The past year opened with bright prospects for a general attack on the trans-continental record; but everything narrowed down by mid-summer to a single well-planned attempt. L. L. Whitman, the fourth of last year's trans-

continentalists, accompanied by C. S. Carris, left San Francisco at 2 P. M., New York time, August 1, and reached New York at twenty minutes past one o'clock on September 3, having accomplished the journey in thirty-two days, twenty-three hours and twenty minutes, practically halving the best previous record. The most notable thing about this attempt was the use, for the first time, of an air-cooled car, the motor cycle and three automobiles used in 1903 being driven by water-cooled gasolene motors. The route taken by Whitman and Carris to the Missouri river was the usual one from San Francisco to Ogden, Utah, along the Central Pacific Railroad and the Union Pacific to Omaha. From Omaha they took a straight course across to the Mississippi river, thence to Chicago; from Chicago East along the Lake Shore and New York Central into New York city, pulling up at the A. C. A. club house. They were received by then-President Scarritt with some little ceremony in recognition of their splendid achievement.

This one trip was the beginning and end of 1904 trans-continental records; and the coast-to-coast race which was so confidently promised last year to be run by this time, never materialized. However, the expeditions already made have contributed a great deal of interesting data and much useful information to the growing automobile fraternity of the United States. These trips have opened the eyes of the public to what the motor car can actually accomplish. Before this series of record attempts were begun, we had even guessed at the routes a tourist would have to choose from in making his way between certain important points West of the Missouri river. Now that we have the complete itineraries of trips already made, people, who wish to travel over this course are in a position to seek out ways and means of bettering the trips already made, both in respect to routes and times—if they can.

The very fast time made by the 1904 party was due very largely to the good fortune which eliminated long delays; and the advantage in this respect over all of the 1903 parties was marked. It may be remembered that Dr. Jackson was delayed longest in Rawlins, Wyo., after he had passed over the difficult detour into Oregon, waiting for a duplicate part from the factory. Mr. Fetch was held up in Denver, Colo., owing to nervous trouble, as a result of the long and dangerous, though successful, trip over the summits of the Rocky Mountains. In 1903 Mr. Whitman was laid up for seven days in Omaha, Neb., waiting for a particularly wet period to pass over.

It is worth noting that every trip so far made has been from West to East—possibly for two reasons—that if anything were going to happen it might better be on the first half, and secondly, that more attention would be paid by the large population of the East to a trip from San Francisco than to one from New York. Thomas Stevens, the pioneer cross-country bicyclist, made his trip from San Francisco to Boston direct, not touching New York at all. All of the trans-continental runs on automobiles, however, have made New York city their terminus. Presuming that the trans-continental race will some time be held, it might be a good thing to make the start from the New York end. This would get everything in shape on the first half and weed out the weak ones, both men and machines.

Taken all in all, the most likely route would be up the Hudson to Albany and to Buffalo along the New York Central, to Chicago by the Lake Shore, to Omaha along the Chicago and Northwestern, through Lincoln and Julesburg, to

Cheyenne, Granger and Ogden along the Union Pacific, thence to San Francisco along the Central Pacific. This would take the Nevada-California grade down instead of up. Favored with reasonably good weather, this grand course (grand in opportunity as in difficulty), ought to be covered in about twenty-five days. Within the lifetime of many readers of THE AUTOMOBILE MAGAZINE, with such road improvement as may safely be anticipated in the meantime, an easy trans-continental tour ought to be possible in even less time than this. A trans-continental trip, though not an easy jaunt in any sense of the word, is still within reach of any motorist who is willing to spend from forty to sixty days (and a lot of money), in winning his laurels.

More spirited competition entered into the Chicago-New York record; due very likely to the shorter distance—slightly over a thousand miles—and the importance of New York and Chicago from a motoring standpoint. Several attempts were made that failed for one reason or another. Finally at 2 o'clock Wednesday, August 24, Arthur G. Schmidt and Jerome A. Ellis, of the Chicago Automobile Club, started for New York over the usual record course and reached their destination at 3.46 A. M., Saturday, August 27, making a new record for the trip of 72 hours 46 minutes. Their time was a slight gain over the best previous performance, but they felt that with good weather and better conditions generally, very much better time could be made. Other attempts followed, but the climax was reached by the record-making trip which stands today at 58 hours 35 minutes, including all stops. This performance was made possible by the skill, endurance and clever work of Bert Holcomb, and his two comrades, Bald and Duffie. This trip was started on Tuesday, October 4 and ended on Thursday, October 6. All conditions were not exactly suitable even this time, and it is believed by the present record-holders that the time can be cut down to fifty hours or less.

The significance of such a record as this between New York and Chicago consists in the comparison inevitably made between motor car times and the regular railroad schedule. True, the distance between these two great cities is covered by a special limited train in twenty hours; but the majority of trains take from twenty-four to twenty-eight hours for the journey, the latter figure being only slightly less than half the time made over a much longer (road) mileage, by a single motor car driven over common roads. Candid comparisons of such times must impress even the most reluctant and lead them to admit the fact of the growing power and service of the American automobile.

It is curious to note that the Chicago-New York record attempts have all been over the line from Chicago, Toledo, Cleveland and Buffalo, thence through the "Southern Tier" of cities, Elmira, Owego and Binghamton, across the Catskill Mountains to the west side of the Hudson river, and to New York via the Weehawken ferry. This route follows the comparatively level line along Lake Erie, which is a part of nearly all record-making attempts between the East and the West. Probably the line across the Catskills is preferred above that of Central New York to avoid the monstrous conditions which still exist in the Mohawk Valley. As soon as new State roads are laid through this beautiful section, however, there is no doubt that the record-breaking attempts will shift to the northward and, on the whole, more level route.

It would be impossible within the scope of a single short article to more than mention some of the other notable

road events of the past year. Of course, the St. Louis tours converging at the World's Fair city on August 10, were something the like of which we are apt to see again. This series of tours was a novel experiment, in which various sections of the country were fairly well represented, and while the event may not have been all that its promoters wished and worked for, on the whole it was creditable to this stage of automobile touring. There have been numerous inter-city records of which the industry need not be ashamed.

No one regrets the abandonment of the formal "endurance runs," which were in such vogue in 1902 and 1903. It had become the general sentiment that nothing more could be proven by this form of competition, and so that sort of thing has been dropped by common consent. It is probable that 1905 will be all the more notable from the standpoint of good road performances. Superiority in this direction will impress the public as nothing else could possibly do, and thereby add to the popularity of the sport and the prosperity of its various interests.

Where the Trouble May Come From

Should there be a loss of power in a gas engine the following points must be examined for the cause: Leakage at either exhaust or inlet valves, sparking plug or piston rings, weak batteries, dirty sparking plug, imperfect contact at the contact breaker caused by a weak spring in the contact arm, or by carbonized oil on the fiber disk and contact pieces or burning of the platinums on the trembler of the induction coil. The latter may be cleaned by removing the screw and trembler blade and dressing up the contact pieces perfectly square to insure good contact when replaced. Put on the switch, put the contact breaker in position to close the circuit, then adjust the screw to the blade till the most violent vibration of the trembler is attained. Fasten the screw in position by means of the locking nut. When making this adjustment it is most important that the sparking plug wire should be connected to the plug and the plug to the cylinder; should this be neglected there is every probability of the coil being injured by burning.

Force of Habit

"I'm afraid something's the matter with that runabout I bought for $60 up at the auction."

"Why, you've been running it to-day over twenty miles without a hitch."

"Yes, that's what makes me think there's something wrong with it. I don't feel easy unless I'm under the machine every three or four miles."

The Long Island Smithy

No more the roan and chestnut, the piebald and the gray
Pound their iron hoofs upon the smithy's floor;
No more the gig and buggy, the buckboard and coupé
Stand broken down and helpless at the door.

He'll pump you full of ether with an auto sorter laugh,
He's fixtures ready-made to mend the fake.
If your tire has collapsed he'll swell it for a half,
With perhaps another dollar for a break.

No more he talks of 'hoss' as he stands upon the green
And waits the motor trav'ler on his way.
He's an artist now in wind, and he's happy and serene,
For he's pumping, pumping dollars all the day.

An Escapade in Toronto

By M. Pollough-Pogue

WHEN these things happened there was scope for much missionary endeavor in Toronto, as far as motor cars were concerned. The pioneer motorists were few but enthusiastic, and the atmosphere was charged with a high voltage of prejudice and hostility. An exclusively Irish police force arbitrarily runs the town in the cheerful robber-baron style of the Moscow or St. Petersburg police. These bulky, red-faced Irishry, fulfilling their destiny, made things as sultry and uncomfortable as they could for the enthusiasts who voluntarily outlawed themselves by driving motor cars. But to-day there are several hundred motor cars in Toronto and even the Irish-speaking police force know a Mercedes tourenwagen from an Orient buckboard. There are only the vivid memories of old things that happened, and as the cigarette smoke twists upward and the whisky and soda rolls down its predestined path, the pioneer motorists of Toronto smile as they recall the old days.

It was in these elder days that Richard Pembroke came to Canada from England, where he had planted what would certainly be, in spite of drought or too much rain, or other adverse weather conditions, a most bountiful crop of figurative wild oats and tares; in fact, he had seeded down half of Great Britain by the broadcast method. His father, Sir John Pembroke, would harvest the crop—that is, the pater would pay the bills; there would be nothing figurative about the bills.

Sir John was a brewer with a large exchequer which was constantly replenished by the copious and never-ceasing flow of golden ducats which accrued to him from the sale of the countless casks of his beer which the British people eagerly poured down their throats in their earnest, persistent endeavor to minimize the yearnings of their insatiable thirst.

But Sir John had four sons who were disbursing his ducats with the eager haste and profuse lavishness of a battery of rapid-fire guns projecting ten thousand missiles per minute in the approximate direction of the enemy.

Finally Sir John decided to eliminate one of his progeny from the fierce vortexes of horse-racing and motoring and other pastimes that swallowed up his dollars as the British people swallowed down his beer.

Dick Pembroke, the youngest son, was the black sheep of the family; in comparison with the life he led, the lives his brothers lived were like the anchorite existence of recluses dwelling in sequestered hermitages.

But Dickie had not done anything really bad, you know—nothing felonious of course. There had been no moral obliquity, no profligacy. Dickie had always drawn the line sharply at that. There had been nothing nefarious at all. Only much insouciant combustion of good, crisp banknotes. A first-class conflagration every day, in fact.

But Sir John thought it would be good strategy to banish the boy for a term of years. So, Dickie was consigned to Canada with a beggarly ten thousand pounds. The money was to buy an interest in a mine or a cattle ranch, or a lumber business, or something the dividends from which would keep Dickie from starving in his exile.

I met Dickie in Toronto a short time afterward, and for several days we led a merry, impetuous life. Dickie Pem-

broke was burning up his ten thousand sovs as a prairie fire cremates the myriad leaves of the prairie grass.

I had a light car, and I am afraid I had neglected to replenish the battery box with fresh, dry cells. One afternoon, with many misfires and explosions in the muffler, we drove out into the country. The engine missed badly and stopped when we were about four miles from town.

I knew that the trembler screw and the trembler blade on the coil were in bad shape. Nearly all the platinum had been worn off the point of the screw by careless attrition with a file to remove the deposit which builds up a tiny cone on the tip. Only a suggestion of platinum remained. The blade was deeply pitted. But when I took out the plug I saw that there was nothing doing.

The cells were in a state of complete exhaustion and I told Pembroke we would have to wait for their recuperation.

"They are dead now, damn them." I said. "But they'll pick up a little. We'll give them half an hour."

" 'On pardonne tant que l'on aime,' " drawled the Englishman, rolling a cigarette.

The fragrant summer wind blew merrily over the fields and the wheat rolled in long red-gold waves. The blood-red sun glowed softly through a thin membrane of dusky haze, like a paper lantern.

We waited half an hour. Then we found that there had been a little recuperation. The mixture ignited in a hit-and-miss way. We swung around and drove back toward the city. For about ten minutes the car slipped along the wide white road, across which the dim violet shadows of the roadside trees sprawled and stretched toward the east.

Again we waited for the effete cells to regain energy. Pembroke talked about a great road race in which he had driven a mighty car with a carroserie like an upturned boat. The sprightly scene flashed before his half-dreaming eyes, the crowd at the starting point, the patricians and the plebeians, the piquante women, the blinding French sunshine, the rushing cars hammering the air with shattering thunder of explosions, the rolling dust-clouds.

"I felt the exhilaration that thrilled the Roman chariot-driver dashing around the hippodrome," said Pembroke. "The blood bounded hot through my veins, my heart sang within me, keeping time with the beat of the leaping engines.

"A swift wind-river swept over the carroserie and smote upon my face and surged roaring past my ears. At times the rushing wind shouted in my ears a hoarse chanty; at times it wailed an eldritch song; at times it blared in melancholy cadence, like the bugle of the wild huntsman, at times it bayed like a hound."

When Pembroke had finished his impressionistic sketch of the race, the cells had recovered a little more vitality. We drove about a kilometer further before they gave up their last flicker of life. This time they were quite dead and would not even vibrate the trembler.

But we were within the environs of the city. The car had stopped at the north end of Yonge street, on the hill where the asphaltum begins. From this point Yonge street slopes down to the harbor, bisecting the city. Omnium Toronto divisa est into two parts by Yonge street.

We left the machine in the street, and went downtown in a trolley car to try to obtain some fresh, dry cells. It was Sunday and of course the shops where dry cells are sold were all closed, but we hoped that we would find one

of the garages open, where we might borrow an accumulator if we could not get any dry cells. But the garages were closed. For some time we hunted about, but in vain.

It was about 10 o'clock in the evening when we returned to where we had left the voiturette. We had had a few high balls to exercise the bacilli of depression, but we were perfectly sober.

"Bai Jove, old chap," suggested Pembroke, "let's coast!"

A mob of boys and men surrounded the machine, making appropriate remarks to the limit of their voluminous vocabularies. A motor car en panne on the street is a beautiful opportunity for the cheap street satirist. And when his satirical remarks are addressed to a motorist there is always a touch of venom in them. In European cities the gendarmes will not permit the mob to collect, in Canadian and American towns the police encourage the rabble when it assembles to annoy a motorist.

But on this occasion the crowd did not annoy us. We were in a most cheerful frame of mind. We seated ourselves in the machine.

"Let the canaille shove us off," said Dickie to me. "Push behind, lads," he said to the crowd.

Several shoved and the car slipped away and slid slowly down the slope over the smooth asphaltum. The gradient was considerable, and for nearly three blocks we coasted. Then the impetus died and the car came to a standstill.

The street was empty of pedestrians and traffic. As far as the eye could see there was nothing but the tall and gloomy buildings, the vacant pavement snowed over with the white glare of the sizzling arc lamps, and ink-splashed with shadows.

Suddenly the stillness was broken by discordant snoring, which produced sound-ripples that mobbed each other in their eager haste to escape through an open doorway. Someone was sleeping with earnest industry inside that doorway. The din which was an accessory of this man's slumber was analogous to the bellowing of a healthy fog-horn endeavoring to jar the atmosphere so that sound-waves will wander through fifteen miles of mist.

"Bai Jove, old chap," said Dickie, "let's wake the bounder."

The vociferous nature of the man's repose suggested a previous encounter with some lethal whisky, and I feared it would be a difficult task to arouse him. But plainly it was our duty to awake the sleeper and get him started on his way home before a policeman came along and pinched him.

Filled with a yearning to achieve this philanthropic deed, we made a reconnaissance with a side-lamp.

Sprawling in a corner, and spreading over a large area of the vestibule floor was an immense human structure, the body of a giant. The mighty muscles in the long gorilla arms were slack; the prognathous jaw hung loose. The man was wrapped in Nirvanic sleep.

His lineage was written all over his broad, ruddy face. His genealogical tree could have grown only in Kerry or Clare.

A small man in a janitor's navy-blue jacket and cap, a little, shriveled man with loosely-jointed legs and bent shoulders, also a recent exile of Erin, stood over the son of Anak. As we entered he thrust out his arms in a gesture of caution, and added a verbal warning in a hoarse whisper.

"Kape away! Don't wake him! If yez do, he'll run yez in, shure! He's the most desperit mon on the force!"

At that moment the hissing song of the trolley wire told us that a trolley car was approaching. We rushed out-

side, for we had left our little runabout on the trolley track. As we shoved her clear of the track the trolley pounded past with a roar that jarred the street.

The terrific noise awakened the sleeping giant. Filled with sinister intentions he issued from the doorway, sidestepping unsteadily. To his blurred intellect our little car had been the source of the uproar that had disturbed him. The fierce glare from an arc lamp illuminated my number tag.

"Wan, nine, foor; wan, nine, foor," repeated the colossus. "I'll rimimber thot. Youse t'ink youse kin run th' town, youse ———, ———, ———"

The bull-toned voice rose suddenly to a howl of fury as blind rage efferversced within him. The ferocity and savagery of a baresark surged in him and he rushed toward us, shouting his terrible war-yells. Our audacious effrontery in being on the street, or even on the earth, had aroused his wrath.

Pembroke sprang nimbly into the runabout and seized the tiller. I gave the little machine a shove which sent it flying down the street, and ran after it as quickly as I could.

I think this fuzzy-wuzzy would have caught us if his knees had not loosened, as old Homer says. His legs became wobbly; they became paralytic; they would not support the huge body. He seemed to trip over something, and fell, thudding on the asphaltum.

A few days afterward I received a summons to appear before Magistrate Kingsford. Gloomy and depressed with misgiving, and premonitions of evil, I went to the police court, expecting to be consigned to a dungeon in the Central Prison for three months at least. I was charged with having scorched down Yonge street, and I knew the atrocity of the crime. I could not deny having scorched. The black shadow of guilt brooded over me.

But, to my astonishment and immense relief, I was merely fined and warned not to do it again.

When Batteries Are Overshaken

When storage batteries are carried in boxes fixed to the frame, or, indeed, in any position which is at all troublesome or difficult of access, their terminals and connections are frequently neglected to the detriment of the ignition. Often it will be found that defective firing results from nothing worse than a loose connection between accumulators, and as this does not exert its evil effect until the car is running, and the accumulators are subjected to road vibration, diagnosis of the trouble has often been at fault. When a cylinder is firing badly, time and annoyance will frequently be saved by going straight to the accumulator box and tightening the connection screws. It is also advisable to clean these connections and screws and the accumulator terminals from time to time. The ignition will always be the better for this.

Alcohol as a Motive Power

By Remington Vernam

OWING to the relatively high price of methylated spirit sold in this country few attempts have been made to utilize it as a fuel in internal combustion motors. We must, therefore, go to Europe for any information we may desire on this subject. Although the use of alcohol in motor-cars has perhaps made more progress in France than elsewhere, yet the quantity of alcohol used as a fuel for motors in Germany is undoubtedly far larger than in France, owing to the fact that in Germany alcohol is looked upon more as a fuel for slow-running motors of 2 to 30 H. P., which though smaller in number are larger consumers. The first experiments in the efficiency of alcohol-driven motors were carried out in the year 1895 by Professor Hartmann. A motor made by Grob & Co., of Leipzig, for investigation by the German Agricultural Society, was tested with both petroleum and spirits. The consumptions worked out at 426 and 839 grammes per brake horse power hour respectively. These correspond to efficiencies of 13.6 and 12.2—the former a fair result for a much more up-to-date petroleum engine. Later in the same year a Körting motor, with a special carburetter tested by Professor Slaby, of Berlin, only consumed 550 grammes per brake horse power hour—a great advance. From 1897 to 1901 a number of makers constructed motors for use with alcohol which ran on a consumption of 390 to 440 grammes per brake horse power hour.

If the question be asked why alcohol was so long neglected as a source of power for internal-combustion engines when efforts were being made in every direction to find an outlet for the overproduction which was taking place, the answer is to be found in a consideration of the relative heats of combustion of this substance compared with those against which it had to compete. It is near enough for our purpose to take the heat of combustion of alcohol as 5,500 and of gasolene and kerosene at about 10,250. At first sight it would appear hopeless to compare two such substances as a source of power unless the price of the one possessing lower calorific effect was approximately one-half that of the other. If the value of a fuel were indeed measured by its heat of combustion, this would be the case; but fortunately it is not so. We depend rather on the number of calories which can be converted into work.

In this respect it is interesting to follow the gradual development of German alcohol gas-engine production. The solitary specimen above referred to showed at a brake test such a consumption that the efficiency was approximately 12½ per cent.—that is to say, 12½ per cent. only of the heat units conveyed into the machine were given out again in the form of work. If we compare with this the results of the exhaustive tests of the alcohol-driven gas engines made in 1902 at the competition for the prize offered in that year by the German Agricultural Society, we at once appreciate what astounding progress has been made. Out of the ten machines entered in this competition no less than three gave efficiencies of from 32.7 to 30.9 per cent. when working on full load. This is an astonishing result, and it places the alcohol motor very high in the list as an economical machine for the conversion of heat into work.

Perhaps it might be worth while to look a little more closely into the re-

sults of the examination of the motors entered in this competition. These were carried out by Professor Dr. Meyer, of Charlottenberg. It must certainly be of interest to learn as far as we can to what these extraordinary results are attributable. In the first place, it is worthy of note that the degree of compression which was used, though very variable, was on the whole very much higher than that which it is customary to use for gasolene-driven motors. In some cases a compression up to 10¼ atmospheres was employed, and the maximum explosion pressure attained was in a number of cases as high as 33 atmospheres.

In order to make the comparison between the various motors a fair one, Professor Meyer reduces the consumption of alcohol per brake horse power hour to a basis of compression of 8; that is to say, the clearance space in the motor was one-eighth of the total volume in the cylinder and clearance space together at the end of the suction stroke. This calculation is carried out by making use of certain assumptions with regard to the specific heat of the mixture, which, though not strictly accurate, are sufficiently near for the purpose in view. As showing that the numbers thus calculated are approximately correct, the following case is cited—that a Deutz motor, working on a compression of 5.91, showed a consumption of 436 grammes per brake horse power hour. If this be converted to a basis of 8.9 compression (which was that actually used in the motor tested in 1902, the consumption, according to the calculation, should be 377 grammes, whereas the actual amount used was 364.

From this it would seem that the higher efficiency of the alcohol motor is due almost entirely to the high compression which can be used. We may ask ourselves, then, how comes it that this compression can be used in the case of alcohol and not in the case of gasolene? During the compression of a mixture of any fuel as vapor and air, heat is given out, and at a certain point the temperature attained by the mixture is such that explosion takes place. This point of automatic explosion fixes the absolute limit of compression which can be used. If the compression be carried beyond this point we get what is known as pre-ignition, that is, an explosion before the piston has reached the end of the compression stroke. Now the temperature which a mixture of gases attains upon compression depends largely upon the specific heat of the substance in the mxiture. In the case of gasolene this is very low; in the case of alcohol it is very much higher, and we have also to bear in mind that the spirit used in these experiments contained 10 per cent. of its volume of water. That the influence of water is to allow of a very much higher compression is shown in the case of the Banki motor, where by injecting water along with kerosene, compressions of over ten atmospheres were attained with safety, whereas without the water from four to five atmospheres is the permissible safe limit. A still more striking testimony as to the influence of water vapor in reducing the ignition point of explosive mixture of gases is shown in the case of the new Voigt motor, where, using coal gas and air in the presence of steam, it was found necessary to produce compression pressures of twenty-five atmospheres before self-ignition took place.

A study of Professor Meyer's work certainly leads to the conclusion that the increased efficiency of the alcohol motor is entirely due to the increased compression employed, and the possibility of employing this compression is due, in the first place, to the low inflam-

AMID SWIFT FLOWING WATERS

mability of alcohol air mixtures, but, in the second place, and in a higher degree, to the water contained in the alcohol. The question might be raised: Why not use more water and a higher compression? This has been tried, and Mr. Exner, of Vienna, has been able to prove that by so doing there is an increased efficiency. Professor Meyer has shown that the addition of further water without a corresponding increase in compression has a disadvantageous effect. The maximum pressure of explosion is reduced, and the combustion is diminished in velocity; indeed, with a certain excess, the diagram points to comparatively slow burning rather than to an explosion. This latter result, obtained by Professor Meyer, goes far to prove that the increased effect is in no wise due to the presence of water after the explosion has taken place, and this is, moreover, what one would expect on theoretical grounds.

The statement of Mr. Griffin that "during combustion the water vapor is decomposed and burnt in combination with the oil vapor, the added heat of the burning water-gas serving to effect the complete combustion of the whole of the heavy hydro-carbons of the oil," is not borne out by Professor Meyer's results, and when we consider that the amount of heat necessary to split up the water is exactly equal to the amount which can be given out on the re-combination of its elements, it is not astonishing that this should be the case. It is true that by increasing the compression we may use alcohol containing an increased percentage of water, and at the same time obtain better useful effect from the fuel, but the percentage gain, which is attained by compressions beyond 10 or 12 atmospheres, is so small that the greater uncertainty of ignition which accompanies it, and the added expense of constructing motors to withstand the accompanying high maximum explosion pressure, more than counterbalance it.

If the above conclusions are correct, the generally received idea that a gasolene motor can be converted into an efficient alcohol motor simply by altering the carburetter is proved to be fallacious. It is true that the conversion of alcohol into a state fit for explosion

requires other means than in the case of gasolene. This is obvious, when we consider that the heat required for the evaporation of alcohol is about two and a half times as great as that for gasolene, and we have further to bear in mind that there is 10 per cent. of water present, requiring five and a half times the amount of heat to evaporate it, compared with an equal weight of gasolene. At first sight it would seem that this would be a serious difficulty in the utilization of alcohol, but if we calculate the actual amount of heat which is necessary to evaporate a certain quantity of alcohol containing 10 per cent. of water, we find that it amounts to only 5½ per cent. of the total heat of combustion of that same amount of alcohol (in calculating the heat of combustions, in all cases it must be understood that the heat which would be given out by the water vapor in the products of combustion condensing from the form of steam is not taken into consideration). This 5½ per cent. of heat necessary to convert the alcohol into vapor can readily be abstracted either from the exhaust gases of the motor or from the water taking away heat from the cylinder walls. We have here some resemblance to the chain of operations taking place in a modern blast furnace, where the exit and once waste gases from the furnace are now used to heat up the air fed to the bottom of the same, or in the case of a Siemens regenerative furnace, where high temperatures and great economy are attained by a similar means.

By making use of the saturation equivalents of alcohol and water for air at various temperatures, it is possible to find out to what temperature the ingoing air into the carburetter must be heated in order that the mixture of air, alcohol, and water passing into the cylinder may be such that there is no necessity for any of the constituents to be in a state of suspension as liquids. We find that it is only necessary that a temperature of 190° C. should be attained. This comparatively high temperature is only required when the mixture entering the cylinder is to contain the maximum amount of alcohol which the oxygen present is able to fully consume, and this, I need scarcely point out, is a state of affairs which it is not desirable to have. It is in all cases preferable to work with an excess of air, in order to make sure that combustion shall be as complete as possible. Of the ten motors entered for the competition before referred to, Professor Meyer found that the one which worked on the poorest mixture with the most economical results would require the ingoing air to the carburetter to be heated to a temperature of 125 degrees in order to carry the alcohol and water in the form of vapor.

The above calculations are carried out on the supposition that the air which is used to start with is saturated with water vapor at a temperature of 15° C., a state of affairs not often attained even in this climate. It is also easy to prove, in those cases where the air is not warmed prior to entering the carburetter, that it is only necessary to heat the mixture of air and alcohol spray to a final temperature of 30 degrees, in order to attain complete evaporation of the liquid; that is to say, contact of the sprayed mixture with a sufficiently large surface at or over 35° C. to evaporate the liquid, and to give the mixed vapors a final temperature of 30° C. is all that is necessary. This, I am sure you will admit, is something which is quite easily within the bounds of possibility.

We may take it that the most economical results will be attained by a

carburetter which delivers the mixed air and alcohol vapor at a temperature as little as possible above that necessary to retain the alcohol in the form of vapor, because by so doing we shall be enabled to work with safety at the highest possible degree of compression.

I am, in making this statement, not taking into account the possibility of some form of Diesel engine eventually being used for motor-car propulsion. In this form of engine the air employed for combustion is very strongly compressed alone in the cylinder, whereby it obtains a very high temperature, and the fuel is forced in its liquid form into the hot compressed air by an auxiliary pump. By this method efficiency about on a par with that of a good alcohol engine is obtained. On half-load, however, the Diesel engine is more efficient than an alcohol engine. There are grave mechanical difficulties to be faced before this type of engine can be used to replace the light, high-speed gasolene engine. It is a possibility to be reckoned with, but I am not inclined to think the problem will be solved in the near future.

A necessary consequence of this is that the inlet valves and induction tubes should be made as wide as possible, in order that the diminution in pressure which is bound to take place on the suction stroke shall be as small as possible, otherwise the expansion produced will lower the temperature, cause the fuel to separate in the liquid state, and reduce the uniformity of the mixture.

In building motors to work with these high compressions where the explosive mixtures are heated up almost to their self-ignition point, it is especially necessary to design the cylinder in such a way that equal cooling of the walls takes place. One hot projection, or extra hot surface, however small, would determine the compression which could be safely used, and so regulate the thermal efficiency. Similarly the admixture of spirit and air should be as intimate and as cool as possible, because, other things being equal, the pressure and temperature of self-ignition is lower, the hotter and richer the original mixture.

Another circumstance which plays a considerable role in the efficiency of alcohol-driven engines has been proved by Mr. Fehrmann to lie in the temperature of the water employed in the cooling jacket. It will be readily understood from what has gone before that the sudden introduction of the air saturated with alcohol and water into a cylinder with very cold walls will have the effect of condensing the fuel and leaving a poor mixture, and such is indeed the case. It has proved impossible to run some alcohol motors with their water jackets supplied at a temperature of 0° C. The great importance of this point, however, was not understood until Fehrmann showed that the amount of alcohol required in some cases to drive a motor on half load was 100 per cent. more when the water in the cooling jacket was kept at about 15° C. than when the jacket was kept at 100° C. This is a subject of very great importance, and all tests of fuel consumption in alcohol motors which do not take this into account will be of little or no scientific value.

A further interesting point brought out during the trials of the ten German motors was the influence of varying strength of mixture on the consumption. Thus a motor nearly at full load, working on fairly weak mixture, and giving only 2.3 per cent. misses on the hit-and-miss governor would have a certain consumption, whereas with the same load on richer mixture with a larger percentage of misses the consumption in some

cases was as much as 16 per cent. higher, and this behavior is not characteristic of spirit motors only, for Professor Meyer has observed the same thing in kerosene engines, where in one case the increase in consumption on the same load reached 24 per cent.

With regard to the general comparison of the properties of alcohol as a power-producing substance for motors, compared with gasolene, I may point out that the combustion of alcohol in the motor under full load is practically complete, and that the products of combustion are odorless, or nearly so. It has been stated that during the explosion of mixtures of alcohol and air, acid substances might be formed which would have a deleterious effect upon the substances of the cylinder and the valves. The Experimental Fermentation Institute, at Berlin, has alcohol motors which have been running for years, and in no case have any signs of such action been observed. Only in the case of a small motor, which is frequently running on very light or no load, it was found that the exhaust pipe was slightly sooted, owing most probably to the low temperature which obtained, and the consequent incomplete combustion.

In concluding this part of my subject I may say that, in so far as alcohol is less volatile, and has a higher ignition temperature, it is that much less likely to be a source of accidental fires. Its storage need not be subject to the same stringent regulations, and in its carriage it is not subject to the same severe restrictions. It is more pleasant to handle than either gasolene or kerosene; it is homogeneous, which is more than can be said for the present supply of gasolene. The composition of the later supplies of gasolene is becoming more and more heterogenous, and there is an ever-growing percentage of high boiling point constituents, which will do their part, no doubt, towards adding to the unpleasant smell of the effluent gases and in diminishing the already poor efficiency of the gasolene engine. An ideal liquid for a carburetter should have a fixed boiling point, then the instrument can be properly arranged for the work it has to do.

If care be taken that the carburetter passes the increased quantity of air necessary for the oxidation of benzol compared with alcohol, and that the temperature of the fluid in the cylinder jacket is kept constant, it would seem that, at any given compression, equal efficiencies are obtainable, but the allowable compression is less the greater the addition of benzol.

That alcohol is not only a suitable motor fuel, but that in most respects it is the most suitable, is shown in the foregoing, but if further proof were needed as to its practical possibilities it can be gathered rom the records of those French automobile trials in which alcohol was used, and of which I would recall the consumption trial through Amiens, Arras, Abbeville and back to Paris, wherein nineteen heavy cars, sixteen light cars, six voiturettes, and six cycles competed. The distance of 453 miles was covered in about twenty-three hours on a consumption of 20.85 gallons by one car and in 26½ hours on 18¼ gallons by another. Again, Mr. Farman, on a 35 H. P. Panhard, covered 254½ miles at a rate of 52.2 miles per hour, using alcohol only as a fuel.

It is true that the results we have been considering were obtained with engines of only 200-300 revolutions per minute, but there is no reason to believe that an increase of revolutions would materially alter the conclusions I have drawn—especially if motor constructors would bear in mind the advisability of trying a somewhat greater ratio of

stroke to bore than obtains in gasolene motor construction in general. (This average ratio in the motors tested by Prof. Meyer was 156:100, and motors giving the best results were constructed to approximately these dimensions.

The average user of a motor does not ask what proportion of the heat value of a certain fuel is obtained as work, but rather what does it cost in fuel to obtain a certain amount of result, and this question we must now consider.

From what I have stated above we know that gasolene and alcohol stand in the ratio of 2:1 as regards their heat of combustion, but that in the case of alcohol 30 per cent. of this heat is obtainable in the form of work, while in the case of gasolene only 20 per cent. can be so obtained. We require, then, four parts of alcohol or three parts of gasolene by weight to yield the same amount of heat in the form of work. The comparison between kerosene and alcohol, taking their relative efficiencies at 15 per cent. and 30 per cent., shows us that these two would have to be sold at the same price to give equal economic results. From now up to the end of 1908, motor alcohol containing 10 vol. per cent. of water is to be had in Germany, delivered at the nearest railway station, at 18 cents per gallon, in lots of not less than 1,500 gallons, and at 20 cents per gallon in lots of 40 gallons, cask free, but returnable. To buy in quantities such as a pint, at retail dealers, it costs at the rate of 30 cents per gallon, at which price it is still cheaper than gasolene at 40 cents a gallon—a by no means unusual price in Europe.

To sum up the problem of supplying motor fuel at a price which will not only render it cheaper than gasolene, but which will enable it to compete with kerosene, has been solved in Germany.

What are the conditions elsewhere? Consider that alcohol as a motor fuel is free for the most part from the objections urged against gasolene; that it is, of all extensively-used liquid fuels, the most nearly ideal; that it is sold by the million gallons abroad for technical purposes as a source of light, heat and power; then ask, why cannot we obtain it in this country at a similar price?

The answer is, that our present laws and our system of taxation render it impossible. In consequence of the disadvantages legally imposed on the American distiller, we pay 70 per cent. to 100 per cent. more for our alcohol than we should do if the tax, which has well been called "a bargain for hindrances to free working imposed by law," were not imposed. It must be fully understood that our complaint as to the influence of this tax relates only to alcohol to be denatured and used for industrial purposes. Potable alcohol must be regarded from an entirely different standpoint.

The space at my disposal at this time is too limited for me to go at length into the question of German as compared with American law in regard to alcohol, either as to production, distribution or use. This in itself is more than subject for a lecture, but I may inform you that although the German Government showed forethought for the chemical industries, they had taken little action as regards legislation concerning alcohol for other technical purposes—heat, light or power—up to the year 1887. At that time commercial alcohol generally cost, retail, at from 80 cents to one dollar per gallon. Since then note the change! There is scarcely a village in all Germany where alcohol of guaranteed strength 90-95 per cent. cannot be obtained retail at from 30 to 35 cents per gallon. At this price it can be bought in bottles just as we are accustomed to buy potable waters.

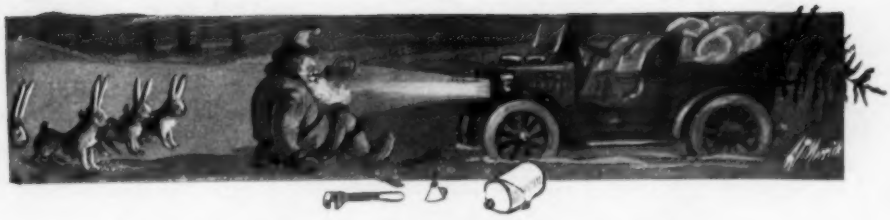
Although I cannot deal at length with those phases of the German law which

have called forth such a notable change, I can, by means of a few statistics, make evident the enormous importance and size the traffic in technical alcohol has attained, and in some ways compare our own position therewith. In the year 1900-1 Germany produced 406 million liters (about $4\frac{1}{2}$ liters = 1 gallon). Of this 112 million liters were used for technical purposes. In the same year England's consumption of technical alcohol was 13 million liters. Please note that this total quantity of 13 million liters is a little over half the amount used by the German chemical industries, and about two-thirds of the quantity used in the manufacture of vinegar per annum. The consumption of spirit in Germany for technical purposes has grown from 71 to 112 million liters in six years; our consumption in the same period grew from 9 to 13 millions. If we progress at the same rate, and Germany stands still, we shall be equally large consumers in the year 2064.

In Germany they have incandescent lamps of from 20 to over 1,000 candle power, cheaper by half to keep up than kerosene lamps, even with alcohol at 30 cents per gallon. Professor Dr. Wittelshöfer, of the Central Society for the Distribution of Alcohol, in his annual address to the members of the Society of Alcohol Manufacturers in 1903, told them that in the first four months of 1902 they sold 270,000 liters of motor alcohol; in the corresponding period of 1903 they disposed of 800,000 liters. In the first three months of 1902 and 1903 the number of lamps sold by this one society grew from 7,200 to 17,000. Not until the Germans have driven kerosene oil out of their market will they be satisfied. As it is, post, army, railway use alcohol for power and light wherever possible. Doubtless the thought that every liter of alcohol so used makes the nation more self-contained has its weight with the Government.

In conclusion I say that the case for a reduction in the price of alcohol for technical purposes is well established. Cheap alcohol would place the rapidly-growing motor industry on a secure basis, because the production of alcohol can be extended almost without limit; it would give our chemical manufacturers a chance of gaining some share of the enormous trade now in other hands.

What the coming of the alcohol-fueled motor would mean to industrial America is a thing so vast and so far-reaching in its possibilities and its probabilities that not even a Verne would dare at this time to hazard a prediction. What such a fuel would mean to the motor carriage and the small marine motor is something almost anyone can foresee; so it is to be regretted that in this, like some other very desirable lines of progress, we are content to sit idly by and let the Germans do both the thinking and the perfecting, later on to be well paid for their thought and energy by ourselves as well as others.



James Green Brown's Chauffeur

By R. V. Pelton

THE following extracts from a small account book found in front of a Y. M. C. A. building where lately there has been inaugurated a school for chauffeurs. Apparently the original owner of the book had used it for a diary and in it had recorded some of his post graduate experiences.

September 15.—I am suffering from depression. The late John Jones Smith was a model employer in every way under the sun and would never drive or ask others to drive faster than twelve miles an hour. Must the innocent always suffer for the guilty? Will the truck horses never learn to love the whirr of a fast traveling car? But there is one consolation, anyhow. I was not in the automobile when it happened. My presence would have only added another item to the tragedy.

If the city would only pad the lamp posts with India rubber, cover the curbstones with felt and put rugs on the pavement many incompetent to drive owners might escape with nothing more than concussions. As it is I must send a wreath and begin to look out for another situation, unless, indeed, by some hook or crook of good luck Mrs. John Jones Smith wants to keep me in her service.

September 18.—I am all in the air. Doubts assail me on all sides. Mrs. Smith cannot bear the thought of an automobile, let alone the sight of one, and she has asked me if I will remain and run the lawn mower. Have received a letter from James Green Brown asking me if I will become his chauffeur at a big salary. Brown, it is said, never travels less than fifty miles an hour and the last request of my Aunt Samantha when she consented to my matriculating at the chauffeur college was that I never go more than twenty. What shall I do? Brown writes that he wants a man who can keep his head. That's me, every time. I want to keep my head. A leg or an arm don't matter so much, but a head is important.

September 20.—Have crossed the Rubicon a la Caesar. Have signed with Brown, who is known as the demon driver of Hackensack. Aunt Samantha's last request has been nullified. It can't be helped, for I needed the money and Brown needed the chauffeur. New employer is a weird fellow. Wears big goggles, covered with a rubber coat and very little of him can be seen. He told me he had been unlucky with his chauffeurs. Five had been all smashed to jelly and three carbonized. I shuddered and decided to take a job with Michael O'Toole O'Flynn next month.

September 22.—Have been looking over the big 60 H. P. machine owned by my new employer. It is a peach. One of the improvements consists of a conning tower, where a sort of camera

obscura detects a policeman for miles away, thus allowing us to keep out of the clutches of the law. Fine thing.

A safety exit is also one of the great things about this car. When the machine turns over all the chauffeur has to do is to press the button and get out. "Got that idea from my last driver," said Brown. "I shudder every time I think of his death." I certainly don't like to hear my employer talk. He says he is going to make Hempstead and back in thirty minutes in the near future.

The salary is the only thing that tempts me to remain. I often think I had better fly. Why oh, why, didn't I heed Aunt Samantha's dying request? If she could but see me now. Aye, there's the rub—she may see, and that right soon. I may butt into her society in a hurry almost any old time.

September 25.—Completely exhausted. Have come back from a trial run with Brown. Have just made a list of the casualties.

We ran into three carriages, overturned a baby carriage, broke down a lamp post and overturned a fruit stand. Brown was in his element. Once we started to climb a tree, but thought better of it after we had hit the lowest branch about four times and we backed up and resumed our journey. I do not remember how we got back. I was so chocked with dust that I could not speak. I dimly recall driving into the garage and it seemed as though the floor came up and hit me in the face.

September 29.—Brown is forever running down French automobiles. "I have to have one of the d——d machines," he said, "because they are so well advertised. They run over lords and dukes and counts over there every day or so, while American machines never hit anything but teamsters and farmers. If we could bowl over a few earls, some barons and a bunch of millionaires I might use an American machine. The worst of it is our millionaires won't run any faster than twenty miles an hour. They have no public spirit."

September 27.—The date is fixed for our big run to Hempstead. Brown is determined to do the run and back in thirty minutes. Several big bets have been made on the event. It makes me nervous to hear them bet on the exact time and manner of our deaths. I am thinking more and more of my Aunt Samantha. She was a good woman.

September 28.—Awful day has arrived. In one hour we start for Hempstead. If I get back I get $10,000 and can go back to Canajoharie and live in comparative safety. If not—but I grow morbid. I wonder why tombstones keep flocking in front of me. A simple tombstone, with a simple inscription would be best, I believe, after all. But why do I think of such things? I have just gulped down the fourth big drink of whisky, the goggles are on, and I am ready for the start. Good-bye, my country; farewell, dear native land. If I do not come——

The diary ends here. It seems the writer of it was sent for in a hurry, for there is a very abrupt termination to the narrative. The newspapers in relating the account of how it happened said he was a brave and loving soul as ordinary chauffeurs go.

Her Reason

Tho' not of scientific mind
The maiden seemed to me inclined
The car by herself to run
Without my help. When this was done,
With wonder in my mind, I said,
"Why is this thus?" She tossed her head.
"Why, when I'm doing this," cried she,
"Your arms for other things are free."

What Radium Might Do

By Prof. James L. Henshaw

WILL the day ever come when the automobilist will be able to laugh at the Oil Trust and care naught for the storage battery one? I think so. When? Ah, who can tell? This is the age of miracles, and we whose heads are yet untouched by the silvering hand of Time have seen too many wonders come to pass to doubt that the near future will bring its share of even greater wonders than those the past has given us. Why should the perfectly powered automobile be among them? Surely, this is not too much to ask of those wizards of science who have already given us such astounding proofs of their ability to harness the forces of nature and to make them do our bidding when and as we wished.

The fact that radium inclosed in a lead box an inch thick and brought near a person in a dark room causes the same feeling as a flash of light on the retina, even when the eyelids are tightly closed, and that the same sensation is experienced by the blind, is attracting the serious attention of medical men, and the successful treatment of many other diseases than cancer may be confidently expected in the near future.

The great problem of the application of radium for illumnating purposes belongs to another class—that is, it would be perfectly practicable if the supply of radium was somewhat more abundant than at present. A small fraction of an ounce of radium properly employed would probably prove to be a good light sufficient for several rooms, which, at any rate during the present century, need never require renewal. As a grain of radium throws forth from ten to a hundred million projectiles per second, the light available from a grain would probably equal several candle power.

Other conceivable applications of radium to supply other forms of energy besides light belong to still another class, so far as can be seen at present, and will only become applicable if the available supply of radium is increased beyond what seems just now possible, for it cannot be expected that such a very radio-active element will ever become very abundant. Radio-active elements are spontaneously breaking up, and the small quantities of radium which are found in uranium minerals from which it is extracted must be regarded as the amount that his survived the disintegrating process which has probably extended through the geological epochs of time. It is therefore not to be expected that a much more abundant source than pitchblende, which probably does not contain more than 1/10,000 per cent. of radium, will be found.

Still another class covers the possibilities of radio-activity which are awaiting further steps of scientific knowledge before they can materialize. The most striking fact of radio-activity is its unalterability. Radium contains an immense reservoir of energy, sufficient to maintain its continuous powerful radiations for many centuries; but all attempts to increase its activity or make it supply its energy at a faster rate have signally failed. If it is ever possible to accomplish this and to concentrate the output of energy which is now being dissipated over several centuries into the space of a few days or weeks, then there is not the least doubt of the result. Professor

Rutherford, from his own experiments and those of Dr. Curie, has calculated the energy stored up in one grain of radium as being sufficient to raise 500 tons a mile high. An ounce, therefore, would suffice to drive a 50-H. P. motor car around the world at the rate of thirty miles an hour.

The possibility of being able in the future to control and store the energy of radium and to liberate it for use as required at any desired rate is the most interesting feature of radio-activity at the present time. If it were ever possible to do this with radium, it would almost certainly be so for uranium, and thorium, which can be produced by the ton and probably contain no less stored energy than radium, but evolve it at a vastly slower rate.

Our fathers busied themselves in speculating as to what would become of us when the world's coal supply was exhausted. A single step of science is all that is needed for that problem to be answered in a manner beyond the dreams even of the scientific novelist, but it must be confessed that science holds out scanty prospects of its fulfilment at this particular moment, but what of that. It does not mean that radium road car is not a possibility, even if it is not exactly a probability.

Contact-Breaker and Commutator

The terms contact-breaker and commutator are at present being very loosely and very improperly used in connection with automobilism, simply because their functions are not definitely and clearly understood by most people. To all intents and purposes, both serve the same purpose, which is that of an automatic switch completing the circuit of an electric current at a given time. The contact-breaker, whether it be of the spring blade or of the wiping contact type, is used in connection with single-cylinder engines only, while the commutator is used on multi-cylinder engines, though its type and design may be precisely similar to that of the wiping contact-breaker on the single-cylinder engine. The very word "commutator" should be sufficiently expressive to prevent this error, as its very meaning clearly shows that its mission is "to commute" the current from one path to another—that is, of course, from one cylinder to another. It could only be a contact-breaker when each cylinder was supplied with a separate source of electrical energy as the accumulator, and with a separate coil, though when the common source of supply is from a single accumulator, notwithstanding that it traverses a separate coil for each cylinder, it then becomes a commutator.

Epitaph

Beneath this mound lies all we found
  Of little Johnny Green.
He filled one night, by candlelight,
  A tank of gasolene.

Cheap Substitute for an Automobile

By Walter Dennison

I HAVE sometimes wished myself that I might have a big touring car. I have thought I would like one very much, but knowing full well I will never have the money to buy what I want, now whenever I find the feeling coming over me I find complete satisfaction in a good, lively scorch on a suburban trolley car.

About the only thing the real scorcher gets that I don't get is the pleasure of holding the wheel himself. I have to let the motorman attend to that; but are there not plenty of owners of automobiles who leave the actual running of their respective flyers to their chauffeurs, content themselves to ride; and I don't see how they can get much more fun out of riding in that way than anybody can get in a good lively run on a trolley car.

Of course you couldn't expect to get what you are looking for, a ride in an automobile, in a city trolley car, stopping at every block or so, though even here in some stretches you may get speed; but for the real thing you want to take a road in the suburbs or one in the country, and most any one of these you might try would give you the ride you are looking for.

If the line you select runs through a rolling and perhaps a wooded country, so much the better; for then you'll get more scenery. If it leaves the winding roads now and then to make a straight cut through private property, you'll then have dished out to you on those straight pieces bursts of speed that will make you laugh with joy.

But you'll get speed and excitement, too, following the highway; fairly tearing along on the levels and taking curves when you come to bends in the road at a speed that makes you involuntarily hold on. And the trip may be not without lively incident.

If the genuine motor car can snap a chain or puncture a tire and get stalled, or run over somebody or something of that sort, so you, on your car, can blow out a fuse and set the car afire, or you can get stalled when something happens to the power, and you can run over somebody, too, for that matter, or you can break a brake chain going downhill so that the car runs away and smashes itself, kills and maims people and that sort of thing.

You can get excitement on the trolley motor car all right, if that's what you want. You might not find so much of it, perhaps, in an afternoon's ride here as you would in the same time on a 60 H. P. with an o'er exhilarated Frenchman running it, but still the trolley is never dull.

Seriously now the man who standing on any of the city's great driving thoroughfares enviously watching the shining motor cars go by, skitin', and wishing more or less mildly that he might have one himself, can get the very next thing to it anyway, and at an extremely moderate expense on any suburban trolley line.

If I might be permitted to offer a word of suggestion to those seeking these inexpensive flyers it would be: Don't seek them as such on Sunday.

They are abroad all right on that day as on every other; but crowded to the limit and then beyond and if you have to stand up five, ten or fifteen miles, automobile effect is in a large measure lost.

Nor would I advise going on a Saturday afternoon if another day can as well be selected, for it will heighten the pleasure and the automobile effect ma-

terially to have room in which to bestow oneself with comfort, from which one can look abroad in like manner.

But it's the poor man's auto sure enough, the suburban trolley car, and its very far from being a bad substitute. If you think you'd like automobiling and you haven't just now five hundred, one, two, five or ten thousand dollars that you feel free to spend for a Grampard-Gilhooley-forty-horse-power- electro-gasolene machine, try the nickel scorchers on the suburban trolley lines; you'll like 'em.

What Causes Loss of Power

Should there be a loss of power in the engine the following points must be examined for the cause: leakage at either exhaust or inlet valves, sparking plug or piston rings, weak accumulators, dirty sparking plug, imperfect contact at the contact breaker caused by a weak spring in the contact arm, or by carbonized oil on the fibre disc and contact pieces or burning of the platinums on the trembler of the induction coil. The latter may be cleaned by removing the screw and trembler blade and dressing up the contact pieces perfectly square to insure good contact when replaced. Put on the switch, put the contact breaker in position to close the circuit, then adjust the screw to the blade till the most violent vibration of the trembler is attained. Lock the screw in position by means of the locking nut. When making this adjustment it is most important that the sparking plug wire should be connected to the plug and the plug to the cylinder; should this be neglected there is every probability of the coil being injured by burning.

Starting in Cold Weather

Here is an idea upon starting a motor which has been found to work very successful when the atmosphere is chilly. It is simply to fill an ordinary india-rubber hot-water bottle and apply it as far round the carburetter as possible, leaving it there for a sufficient period to enable the carburetter itself to draw some heat and thus assist vaporization. Another method is to wrap around the carburetter some absorbent material, such as large size lampwick, which can be carried for the purpose, and to pour over this hot water, repeated applications of which will raise the temperature of the carburetter even higher than will be obtained by the usual heating by a branch from the exhaust.

Knew What Was Coming

Stranger (in Speonk).—Are you the local judge?

Judge Mossy—I reckon I am!

Stranger—Well, I am the advance agent for Percy Van Rocks. He wants to tour through Long Island and I am here to settle his fines in advance so as to save delay!

Common Tools and Their Proper Use

By T. B. Wakeman

IT is an aphorism that a mechanic is known by his tools, but rather should it be said that he is known by his use or abuse of his tools. No man can do good work without the proper tools to do it with; most men do not do the best work the tools are competent to do because the men do not understand the proper use of the tools. Take the hammer as a fair example. Here is one of the most universally-used tools and one which every automobilist should carry in his car and should know how to use properly. How many are there, though, who do either one or the other?

Simple as the removal of a bolt which fits snugly is, the average amateur will go at the thing as though strength was the only essential in the matter, whereas usually this is a minor requirement. The correct procedure is something like this: After the nut has been completely removed, careful aim should be taken with the hammer and one sharp decisive blow given to the bolt directly upon the top and with the center of the face of the hammer.

It is, of course, perfectly evident that, if the bolt be struck at all sideways, the screw thread will be burred and thus prevent the nut being again replaced until the thread has been restored by means of a triangular file, or by the edge of a square file, methods which are not conducive to the satisfactory working of the screw thread. Where possible, it is far better to slack off the nut until the top is level with the top of the bolt with at least one-eighth of an inch intervening between the top of the nut and the face of the piece, when so much care need not be exercised, since under these conditions there is no danger of spoiling the thread. In extreme cases it is even advisable to screw the nut half way off the bolt and deliver the blow on it rather than spoil the thread itself, but it will be understood that it is injudicious to deliver heavy blows in this half-way-off plan, as the force of the blow would be borne by three or four threads only.

Straightening a rod is another operation where it is inadvisable to use a hammer other than in an intelligent fashion. It would be far better to place the rod between two pieces of hard wood, into which a groove has been cut, for preference. When the blows are given direct to the rod the surface is left indented with the hammer marks, which, if the part has to work through a guide, is liable to cause it to bind; and, even if it is not working through such a guide, it is unsightly, and an evidence of bad workmanship to see such marks on any part of the car.

In riveting two parts together, or where the end of a bolt is upended to prevent the nut working off, the face of the hammer should not be used. The ordinary machinist's hammer is provided with what is termed either a ball or flat pein. The ball pein is, of course, the spherical face, while the flat pein is more of the blunt wedge form. For riveting, the ball pein is preferable. The rivet should be held up tightly by the head, while the opposite end is riveted over. To commence the process, the edges of the rivet should be gradually worked over, going all the way round with the ball pein, and working up to the center so as to leave the form of a half-round head, from which the indentations may be removed by means of the flat face of the hammer so as to leave as neat a finish as possible.

The chisel is a tool which does not

figure in every automobilist's outfit, yet it is one of those tools which when it is wanted is wanted badly. The usual "cold chisel" is made of octagonal cast steel in sizes which vary from one-half inch to one inch in section and about 6 and a half inches long. To get a thoroughly reliable tool, it should be forged, hardened, ground and tempered by an experienced toolmaker. Though it looks the easiest thing in the world to use a chisel properly, when the novice comes to handle it, unless care is taken, sore hands and barked knuckles invariably follow, yet all that is required is a steady hand and eye. Put the edge of the chisel where the cut is to commence, and strike a deliberate blow fairly on the head. The chief thing to observe is to strike the chisel squarely upon the head, so that the full force of the blow is delivered to the cutting edge. If the blow is struck the least bit sideways, the force is at a greater or less angle to the cutting edge, the result of which is the tool jumps from the work, and a piece of skin frequently flies off the left hand, or the edge of the chisel is broken off and the tool ruined.

Two or three files are indispensable tools which should be included in the outfit of every motor owner, whether he use a 2 H.P. motor boat or a 70 H.P. racing car. Generally speaking, the most useful sizes to carry are 6 inches long and of flat and half-round section of a "cut" known as "bastard," this being between the rough and smooth files. There is really an art in using a file, more so than would be imagined, for even the trained mechanic who can file perfectly flat accomplishes something to be proud of. As it may happen that a flat surface has to be filed up at times, the method of arriving at this will be of interest. If an appreciable amount of metal has to be removed, the file should be used across the metal at an angle of 45 degrees, first in one direction and then in the other, so that the file marks make a right angle to one another. When almost sufficient metal has been removed, the final touches must be given by "draw filing," preferably with a fine-cut file. This is done by taking the file in both hands, and, holding it at a right angle across the piece, draw it backwards and forwards along the surface, using a gentle pressure all the time the stroke is being made.

It will be noticed that the first file marks invariably show in the center of the surface, and work down until they reach the edges. If a fine file is not at hand, it is better to reduce the cut of the "bastard" by filling the teeth with a little chalk and oil. In filing flats on spindles for keys, the above method is always employed. In reducing the diameter of a short rod, or spindle, by filing the "drawing" action, should always be used. For instance, suppose an exhaust valve stem has to be reduced to fit the guide. This is the way this should be done: Over the vise jaws place a lead or copper clamp, so that the cutting on the jaws cannot mark the stem. Place the jaws at such a distance apart that, while the stem is not actually held between them, it is sufficiently wedged in by the pressure placed upon the file to hold it in position. Obviously, the greatest care should be exercised in filing up such parts. The most difficult of all files to use is the round one, and when a perfectly round hole is required, it should never be touched with a file, but reamed out, only the roughest of work being touched with a file, so far as enlarging holes is concerned. A file which should be carried is a flat watchmaker's for truing up platinum contact points.

Cylinder Dimensions and Engine Speeds

By Fenton MacFarlan

AT the present time unfortunately there is no fixed rule by which the buyer of a gasolene motor can determine the number of revolutions at which such an engine should run. The tendency for the moment is to increase the revolutions of the slower speed engines and decrease those of the higher speed, so that probably as time goes on most engines will run at an approximate normal speed of 1,000 revolutions per minute.

With a well-balanced engine this appears to be quite a reliable speed at which to run, and the all-round efficiency of an engine running at this speed appears to be entirely satisfactory, since with it there is less liability to overheat the cylinders, bearings, and valves than with higher speeds, while at the same time there is not so much wastage of lubricating oil.

A great many engines are made either with bore and stroke of equal dimensions, or the stroke of the piston longer than the diameter ot the cylinder. If a high rate of revolutions is combined with long stroke, the piston speed becomes high relatively to a short stroke engine. The result is the long stroke engine does not lend itself to racing much above its normal speed for any length of time. As the heating effect on the cylinder increases rapidly, much more lubricating oil is required, and invariably after a time "knocking" ensues; the engine then exerts less power, slows down, and stops altogether, however efficient the cooling water arrangements are. With a small bore, long stroke, slower speed engine, more advantage can be taken of the expansive force of the gases in the cylinder, whilst the large bore, short stroke, high speed engine depends much more on the "impulse" effect of the explosion on top of the piston. For a given power developed, theoretically, there should be less internal friction in a large bore, short stroke engine, and hence a more efficient engine should be obtained.

Again, taking the relative piston areas of a 4-inch diameter and 5-inch diameter engine, it will be seen that, since areas vary proportionately to the square of the diameter, although the diameter has only been increased by one-quarter, the area has been increased in the ratio of twelve and a half to nineteen and a half, or by nearly two-thirds the total. Hence all bearings and wearing surfaces should be increased in the same proportion, and also by a further amount due to the increased number of revolutions of the high speed engine over the low.

This is a point frequently overlooked by designers, whereupon arise the complaints that the large bore, short stroke, high speed engine is a type that rapidly wears out or knocks itself to pieces. When properly designed, both high and low speed engines have their particular field of action, wherein by various circumstances one or the others is best for the special object in view.

For motor cycle and very light car work, a high speed, small bore and stroke engine is mostly used, because small overall dimensions can easily be obtained, the enclosed flywheel type of

engine lending itself particularly well to compactness, neatness, cheap manufacture, low cost of upkeep, economical running, and is easily adapted to fit in wherever required. Very little exertion is required over the compression at starting, owing to the small cylinder dimensions, and the effect of each explosion is not felt when running at anything approaching the normal speed, but rather a uniform turning effect, owing to the small interval which elapses between successive explosions. A small weight of flywheel is required, owing to the high speed at which it runs, a large reserve of energy thus being easily stored up in a comparatively small and light flywheel rim.

When larger power engines having more than one cylinder are employed, the number of working impulses per cycle of two revolutions transmitted from the piston to the crankshaft is increased by the number of cylinders added, if firing is carried out consecutively; in this case, the turning effect becomes more uniform and more closely approximating to that of a steam-engine, and the engine will run at low speeds without the force of each explosion being noticed.

With a single cylinder of large bore, when required to run at slow speed, a large and heavy flywheel must be provided to get over the compression stroke, otherwise the engine would slow up and refuse to do this. Slower speed means lower power in practically direct proportion to the reduction in the number of revolutions; therefore the area of the cylinder must be increased again, and thus again the flywheel must be increased. Hence it follows that a large bore, long stroke engine running at a slow speed must come out larger and bulkier, as well as heavier, than a similar power engine of smaller bore and stroke, but running at high speed.

On heavier cars, where every pound of extra weight is not of such vital importance, multi-cylinder engines are used in conjunction with lower speeds, heavier flywheels, medium bore, and longer stroke. The relation between the proportion of bore to stroke and how they affect the power developed has not yet been fully thrashed out. Assuming, however, equal compression in all cases, and taking an engine having cylinders 4-inch bore by 6-inch stroke, it is certain that for steady continuous scale readings on the brake test a more uniform and higher horse power is obtained than with an engine having the same cubical capacity, but the bore area and stroke so proportioned as to give the ratios of 4-inch bore area and 6-inch stroke inversely, *i. e.*, approximately 6-inch bore by 3 1/16-inch stroke, or 5-inch bore by $3\frac{7}{8}$-inch stroke.

For the varying conditions of road work, where the power taken from the engine is very variable, the long stroke engine proves superior for long pulls over hilly country, but for shorter stiff stretches which may be rushed the short stroke engine is superior, for it can be accelerated for a short time to much above its normal speed without damage; but the long stroke engine is more sluggish in its action, and cannot be accelerated to anything like the same extent, and is also prone to vibrate excessively. Hence speed gear changing must be oftener resorted to. After all, the proportions of bore to stroke are not of vital importance, but have interest more from the scientific and specialist's point of view.

What the buyer of an automobile requires is to be sure that a motor will do all that is required of it in the way of performances in actual work, *i. e.*,

DR. HAROLD E. THOMAS, CHICAGO AUTOMOBILE CLUB
(Entered for 1905 Gordon Bennett Cup)

the points to look for are: Reliability, freedom from excessive wear, freedom from vibration running light or under load, simplicity and sound design, no tendency to overheat under ordinary conditions of working, accessibility of all parts likely to require examination or renewal, economy in running, both in gasolene and lubricating oil, and fair price for value in the motor.

To expect to obtain all of these in one particular brand of motor is not unreasonable, and they can be obtained, provided you are willing to pay fairly for them. In this case, the extra first cost is never regretted, and such a motor is bound to give pleasure and every satisfaction in use.

One Effect of Irregular Firing

When an engine is heard to knock very violently, so much so that the first impression given is that either the crankshaft has broken or the big end bearing bolts have worked loose, it is well, before jumping at either conclusion, to examine the ignition carefully. An example of this occurred at the end of a short tour in which the engine started thumping so badly that the driver of the car feared to run it any further and wired the makers that something had gone seriously wrong with the engine. It was ultimately discovered that the contact blade of the commutator was fractured, and that the banging was due entirely to irregular firing caused thereby.

Wear and Tear

There are a great number of people, both actual and prospective automobilists, who have the haziest possible ideas as to what the actual wear and tear of the various parts of a motor car are. Commence with pneumatic tires. If a set of good tires are treated well they should survive at least two years and a half of average running. By "treating well" is meant not using brakes violently, so as to skid the wheels, and not turning sharp

corners at a high speed. The shoe should be watched for cuts, and as soon as there are any, fill them up, so that the wet cannot penetrate and loosen the tread completely. Some people advocate the system of equal wheels and changing the covers over, but this is a somewhat questionable advantage, because if a tire is worn very much and is placed on the front wheel and bursts, a smash may result, since a burst tire on the front wheel is considerably worse than a similarly damaged one on the back wheel.

With the ordinary bearings such as are used throughout the gear-box and engine, a car should run well for ten to twelve months; after that time they should be examined to see how much wear has set in. Ball bearings are practically everlasting; if a ball bearing is going to give out it will do so almost at once; if not, and it is a good ball bearing, it will never give any trouble at all. The life of a chain is something that depends, first, entirely upon the way the chain is made and then upon how it is attended to. If two sets of chains are kept, so that there is always a set at hand to replace the running set when it may have become wet and clogged, and therefore have to be properly cleaned, a pair of chains should then run some 20,000 miles, which represents about a year and a half or more of average use.

The change-speed gear of a car in careful hands should easily last three years; and there are many cars running to-day with the same gears they started with five and six years ago. There are other parts of a car which are liable to wear and tear, *e. g.*, steering connections, joints, speed-lever, and striking-lever connections, but the wear in these parts is comparatively slight, and in all good designs is easily adjustable.

Cooling System Should Be Cleaned

After a car has been in continual use for some time, it is not a bad plan, if you have nothing particular to do, to thoroughly overhaul the cooling system, washing out the water tank and the jackets, and thoroughly cleansing the pipes and coils by means of a hose. It is wonderful what a lot of dirt accumulates after a long spell of continued use of an engine or car.

Fitting of Rubber Mats

The mats on a car should be cut to fit exactly—not like too many of them are fitted, which is not at all. The best way to secure a proper fit is to make a pattern out of brown paper, cutting it so that it sets snugly over the flooring in one piece. Holes should then be made for any pipes, etc., with a slit to allow the pipe to be put into the hole. Too much stress cannot be laid on having the mats to fit close up to the dashboard, since doing this not only helps to keep the electrical wires and machinery dry when it is raining, but at the same time it prevents the wind blowing through the various joints and holes, which tends to make the feet cold.

Watts and Volts

By "The Repairer"

WITH all the bewildering language usually employed by scientific and mechanical experts removed from it the following very lucid and interesting description of what a watt is and why, has been issued in trade pamphlet by the makers of the Duro battery.

The watt is the unit of electric power and 746 watts equals one horse power. That is, continuous output of 746 watts from a storage battery represents one electrical horse power, and if we apply this energy to run an electric motor we will get a return of from 60 to 80 per cent. of one mechanical horse power, depending on the efficiency of the motor making the conversion.

The number of watts available from a storage battery is ascertained by multiplying the number of amperes by the number of volts. As an illustration: each cell of battery represents two volts, and if we have 40 of such cells connected in series there are 80 volts at the terminals. If we draw a current of 10 amperes from this series of cells we have 80 volts multiplied by 10 amperes which equals 800 watts, or a fraction over one electrical horse power.

If you wish to utilize these 800 watts for four hours, each cell of the above series of 40 cells must be capable of giving out a discharge of 10 amperes continuously for four hours, and the capacity of this size cell would be rated as "40 ampere hours."

If double the above amount of power is required for four hours, or two electrical horse power, 1,600 watts would be necessary, and each cell of the above series of 40 cells must be doubled in size and capacity so as to be capable of giving a discharge current of 20 amperes continuously for four hours. You then have 80 volts multiplied by 20 amperes, of 1,600 watts, and the capacity of this size of cell would be rated as "80 ampere hours."

The volt is the unit of electrical pressure, and in making calculations it is used in much the same sense as pounds pressure of steam, compressed air, etc. The volts or voltage is independent of the size of the cell; a cell the size of a thimble has precisely the same voltage as one the size of a barrel, providing both are of the same type and construction. This point may be illustrated by two steam boilers, one being of a capacity of a quart, the other holding several thousand gallons, but both showing 100 pounds pressure on the gauge. The voltage of a storage cell depends on the material used in its construction, and varies in the different types from less than one volt up to over two volts. The lead-sulphuric acid cell in general use has two volts.

The ampere is the unit of current or volume, and may be illustrated by the fact that a larger wire is required to conduct a current of 20 amperes than is necessary for a current of 10 amperes, just as a larger pipe is necessary to deliver 200 gallons of water per minute than for 100 gallons per minute.

Both the ampere and volt are elements of electrical power, and an increase of either will give a corresponding increase of power. A battery of cells capable of supply 10 amperes and 100 volts will give precisely the same amount of power as one giving 100 amperes and 10 volts, as the number of watts is the same in each. However, in applying a battery to the operation of an electric motor it is necessary that the voltage of the battery does not exceed that of the motor, and the number of amperes be made sufficient to generate

the amount of power in watts the motor is capable of.

The watt hour is one watt continuously for one hour; 746 of such watt hours represent one horse power hour.

The ampere hour is one ampere flowing continuously for one hour. As the voltage of any given type of cell is a fixed quantity, the capacity and size of the cell is rated in "ampere hours."

The kilo watt is 1,000 watts.

Ampere Hours per Pound.—If a cell weighing 10 pounds gives 10 amperes continuously for 6 hours, its output is 60 ampere hours, which divided by 10 pounds, gives six ampere hours to the pound of cell.

The terminals of a cell are marked positive and negative, and if connecting a series of cells in a group the positive of one is connected with the negative of the next throughout. The electricity flows out of the positive terminal and into the negative.

In the operation of charging storage batteries the current of electricity always enters the battery at the positive terminal.

She Was Suspicious

"And now, darling, it only remains for you to say when——"

But at this moment the big touring car, which had reached the brow of the hill, started down the other side with frightful velocity.

The young man hastily applied the brake.

It failed to work.

He shut off the power.

It was too late.

The unchecked machine raced down the steep grade.

At the foot of the incline there was a sharp turn to the left.

Here the car left the road and ran down the embankment, throwing the young couple out and landing them in a big pile of sand.

"Never mind, darling," exclaimed the youth, who, with cap gone, collar loose at one end, and coat ripped up the back, was presently engaged in digging sand out of the hysterical maiden's mouth, "this is one time that the course of true love ran smooth, even if it did get a bit of a jolt at the end of the run."

"Cyrus Winterbottom," she said, half an hour later, as they were journeying toward the nearest repair shop in a farmer's wagon, "I believe you did the whole thing on purpose so you could have the chance of saying something smart."

Seeking Specifications

"You are the light of my life!" he protested to the fair young thing who shared the front seat of the big touring car with him.

"Candle, kerosene, acetylene or electric?" asked the automobile wise girl, for well she knew that all lights are not held in the same esteem by motorists at the present time.

Some Little Accident Causers

By John D. Campbell

ACCIDENTS to automobiles have become a serious matter, and something which calls for careful consideration of their cause and prevention. Some of these accidents are always due to reckless driving and, when the condition of the operator has been normal, to the placing of too much confidence at high speeds in a constant condition of the road and the bestowing of too little consideration on what may be the effect of a greasy road on adhesion when attempting to make a turn, or in turning out, when running at a high speed. Many accidents are due to damaged tires or defective parts, like the steering gear for example.

A NEW JERSEY WRECK—What was left of an automobile which tried to pass between two Newark trolley cars going in opposite directions

While it is not possible to prevent failure of parts the liability can be lessened by careful inspection and maintenance of each detail. Commencing when the car is new and increasing with its age, this care should never relax. It is an error many novices make to suppose that the failure of a part is due to its sudden fracture. As a rule the foundation of a breakdown has been laid at some previous time, or it may result from a continued and extending action; a rough road may cause a slight fracture or defect, which gets no better with time. This continues until the limit of resistance is reached when failure occurs. It is to discover these incipient defects that close inspection is required to prevent failure and when discovered, the defects should be remedied at once.

Failure of the steering gear has resulted most frequently from breakage of the arm of the steering knuckle, loss of bolts and occasionally breakage of the connecting rods. The breakage of knuckle arms is the most frequent, particularly in the case of the light cars. This is not due to lack of strength in the arms themselves; they are plenty strong enough for any work they may rightfully be called upon to do; the failure takes

place at the shoulder and is brought about by the constant vibration in the arm, due to the play of the connecting rods, which send a wave of vibration through the arm to end at the shoulder causing molecular displacement at that point to continue until the arms break.

Vibration of this part due to the conditions of the road, is unavoidable and will exist with any overhanging weight. In many cases weakness of the steering gear is aggravated by ill-fitting bolts in the connections. Much of the first-named fault can be overcome by putting a support under the rod which will carry the rod's weight, yet permit it to move freely, what danger remains with its effect upon the arms can be taken care of by making the knuckle arms thin as possible, so that the vibration will be distributed and lost in them before it reaches the shoulder. Strength is gained by making the width of these arms, which is in the direction of the work to be done, sufficient to do what is demanded of them with safety. A very important detail in steering, is that the bolts fit properly. It is not sufficient that there is a bolt in place, with the usual jam nuts and pins, the bolts should fit the holes.

Most bolts do this when they are new, but they should be so made that they will remain a fit, and can be held tight in the jaws. To insure this requires that the rod jaws should have sufficient depth at the holes to give them a good wearing and holding surface. The bolt must be two size bolts with good shoulders which the nuts will tighten against one jaw and hold it or the bolts securing into one jaw against the shoulder with the usual jam nut and spring cotter.

Bolts should be made as large as possible consistent with proportion to the machine and strength should not be considered as much as the securing of them properly. The bolts should have sufficient wearing or holding surface so they will remain a fit for a reasonable time. Attention to this will insure the life of the jaw and connections as well as of the bolt itself, while it will prevent unnecessary shaking and rattling of the connections, reduce the vibration in the arms and prevent that wriggling motion in the front wheels due primarily to loss of motion in pins and bolts. The necessary increase in weight that all this would make obligatory would be but small, while the result obtained would more than compensate for the effect on the power.

A common practice of the automobile manufacturer is to braze the jaw into the tubing of the steering rod. It is a question if this is the best method. At its best too much depends upon the uncertainty of the work; perfect brazing in all work requires that there shall be a sufficient space between the metals to permit the spelter to run in and unite all parts and that sufficient heat shall be applied so as to make the spelter run. This heating does not help the tubing, but to the contrary it insures its liability to fracture at the point where the heat is applied through the continual vibration brought about when the car is in service.

What is required is some form of construction which will not depend upon any unknown factors, such as there must always be in brazing. There are several ways of accomplishing what is needed: one is to have the shank of the jaws fit into the tubing with a long fit—to fit this well and to secure it with taper pins. Such a method as this would produce a flexible connection and one which would give warning before breaking when it was being overworked. Another method would be to screw in the shank of the jaw and lock it with a nut. This, however requires heavy tubing to hold the necessary threads and has also the objection that the bottom of the thread makes a good starting point for frac-

ture, which is extremely difficult to discover. All parts of an automobile require constant care. Limitations in weight result in vital parts being made light with the very natural result that in far too many instances more attention is given to weight than to security has been given so that important parts on which so much depends are left dangerously skimped.

Repairing a Cracked Cylinder

By James R. Johnson

IN the course of a paper recently read before the French Society of Civil Engineers, M. Jules Garnier described a method by which he repaired the cracked outside casing of the water jacket surrounding the cylinder of a high powered explosive motor. The author of the paper said that he had cemented wide cracks with a composition of sulphur, iron filings and sal ammoniac. In the present case, however, the crack was too small to allow the introduction of anything but a liquid, which led to the idea of utilizing the property which the copper salts have of depositing metallic copper when brought in contact with metallic iron.

To accomplish this the cylinders, the jackets of which each had two openings for the circulation of the water, were placed vertically over a zinc basin. The lower openings were closed by a cork and the jacket filled with a slightly concentrated solution of sulphate of copper, through the upper opening. The solution leaked out rapidly through the cracks, collecting in the basin, from whence it was poured back into the jacket. The leakage was rapidly reduced to a mere sweating, so that it was sufficient to pour it back every hour.

At the end of the day air was pumped into the jacket, giving considerable pressure on the liquid. This slightly increased the sweating, but as the extruded liquid was nearly colorless instead of being blue, it was obvious that the operation was nearly complete, and on the following day the cracks were perfectly tight and the cylinders were mounted and once more brought into use.

Three Cylinders vs. Four

Those who are still believers in the possibility of triple cylinders having a place in the economy of the automobile do not, however, maintain that a

HIS OPPORTUNITY

THE OTHER PEBBLES—"Where are you going?"
MR. ONLY PEBBLE—"To Ormond—if they will allow me."

three-cylinder engine is better than a four, but they do claim that the difference between two and three cylinders is definitely greater than it is between three and four cylinders; in fact, they assert that on a properly built three-cylinder car very often experienced motorists, who, not knowing that the engine was a three-cylinder one, have thought that the car was being driven by a good four-cylinder engine. This statement is interesting, as it comes from constructors who have made a special study of the three-cylinder engine. There are many who believe that the three-cylinder engine will, if it has not already done so, be made to equal the four-cylinder engine. When it is considered how much more experience is available concerning four- than three-cylinder engines, this belief is not altogether unreasonable, particularly, as it would seem as though the three-cylinder engine provides a better balance of the reciprocating and revolving parts than the four-cylinder one does. On the other hand, those who admit that while they have tried three-cylinder engines, which run with the same smoothness as a good many four-cylinder engines, yet they one and all say they have not sat behind a three-cylinder which was as good as the best four-cylinder engines. However, there is no reason why the three-cylinders should not be further improved and thereby add yet another mechanical discussion point to the automobile.

How to Oil a Motor Properly

Lubrication is one of the most important points in the running of a motor; neglect on this score may result in very serious consequences, most probably a total breakdown of the engine. Ordinary gas engine oil should be avoided, being quite unsuitable for high speed engines. Oil of a very high flash point and free from deposit at high temperatures is the most suitable. With the pump system of lubrication it is preferable to oil often and in small quantities. With the drop feed system the lubricators should be set to give from five to six drops per minute for each cylinder.

Good-by, Mr. Oldun!

Good-by, Old Year!
You who a welcome had
With all the gladness that our hearts could muster.
We hankered for the changes you might bring;
We loathed your predecessor, cross old thing;
We thought no other could be quite as bad—
But say, old man, you've surely been a buster!

Good-by, Old Year!
We hate to see you leaving,
Though numerous were the trials that you brought us—
Some reverses, long forgotten bills,
Not too much pleasure, far too many ills;
Cause for rejoicing, causes some for grieving—
And yet some valued lessons you have taught us.

Good-by, Old Year!
We toll your parting knell,
And then we turn to greet the New Year coming.
We hope and pray the future he'll disburse
If better not than yours will be no worse.
You did your best. If he will do as well,
Why, he can live and thrive and keep a-humming.

THAT automobiling is to-day the sport of kings is true, that it should really be the king of sports is not quite as true as we who love it would like to see it.

Take automobile racing as the best example. I have spent more than one sleepless night going over and over in my mind the question of why this motor racing is not the success it should be. Certainly no other means known to man will carry him as fast and as far; none other is more thrilling; none is more expensive, none is more beloved by those whose favor makes or breaks the public fancy. Why then does the automobile lag so very far behind the horse when it comes to comparing them as racing attractions? It is all bosh to say that it is because you can not love a machine as you can a horse; ninety and nine out of every hundred who own, race or who go to see horses raced, don't love a horse a bit more than they love an automobile, a lobster salad or a bowlegged baby. Where then is the far greater drawing power of the four-legged horse power generator over the four-cylindered one?

If you will permit me, I'll tell you what my answer to the mystery is, though I do not claim that it is the correct one. To begin with the horse holds first place because of the long perfected betting system which the world over revolves around him; second, because though constant study contests among horses have reached such an exact science that the handicapping of them really means something and actual races result which are never won for or by any contestant until he has passed first over the finishing line; third, because of all animals he has for the longest time been regarded as the particular badge of quality and wealth; fourth, because as a racing machine he is most beautiful and in a manner most emphatic tells all who see him run who his owner is.

Now if my ideas are correct, then we have a quadruple-headed cause for equine supremacy which, while it is definite enough, is by no means one which cannot be overcome at least to the extent of bringing the racing machine somewhere within hailing distance of the racing animal. I will pass over the first count in the case because I know I am too strongly prejudiced against betting to make any opinion of mine in regard to the advisability of betting's introduction into automobile racing other than a most biased one. The second count is one easy of being overcome far more so with motors than with horses, I should say. In dealing with machinery you have some fixed,

mathematical and practically unchangeable facts to deal with, hence it seems to me much easier to produce the theoretical dead heat by handicapping machines than to do the same thing with animals. I confess, however, that I have not yet seen any evidences of this in motor racing. Horses come in bunched at the wire until only an expert can separate the first flight; automobiles after several nice and bespectacled gentlemen have measured, cube rooted, algebraiced and trigonometryed them string out like a lot of whirring sausages anything from a city block to a couple of mile laps separating the also rans and the winners. That may be almost anything, but it isn't racing, it isn't sport and it isn't exciting. The love count I pass quickly by because as a married man I am not prepared to discuss such matters publicly. This brings me to the fourth part of my theory.

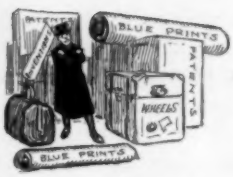
Here is at least one place where we can make a start towards placing automobile racing upon a higher plane. At the risk of hurting the feelings of some of my best friends I have to say that the racing chaffeur is a thing for gods and men to hold their hands in horror at. Costumes fit more for the work bench or the old clothes emporiums of Baxter street seem to have first choice in the affections of those who appear before the grand stand. Compare a lot of jockeys in their silks and satins with an equal number of chauffeurs in their overalls and undershirts, greasy, grimy and dirty, and then see which you would be the proudest to sit in the grandstand and say you owned, the shiny coated animal, with its bright costumed driver, or the leaden colored machine with its load of overalls and grimy underwear. You don't like the picture? Neither do I, but it is a true one for all of that.

Let us change it. At least we can do this much. How? Very easily. Make appearance an essential. Forbid any driver or helper from starting in a race who does not wear a duly registered set of racing colors all made after a uniform type exactly as the jockeys do, and at once you have gone a long ways towards catching up with the horse in the popularity stakes. Picture to yourself a field of glistening, highly polished machines, engines, if you will, each with a driver and maybe a helper clad in some distinctive costumes which permitted the onlookers to know who the driver was at every part and portion of a race, and once you have a vision of all this do you think you will have any difficulty in understanding one of the reasons why the present form of automobile racing is not attractive? Later on I expect to have a chance to carry this racing colors theory of mine into practice, and if I succeed in doing so I am confident that never again will the overall and the undershirt be accepted as the proper costume to wear while handling the wheel of a racing car, a position of honor which deserves something better than an overall costume.

The year is dying; soon 'twill lie
Behind us in the fading past;
We watch it going and we sigh
To think it couldn't always last.
All pensive for a little while
We count the vanished years and fret.
Then greet the new one with a smile
And hurry onward and forget.

The passing years are like the men
We have to serve—they pass away;
We mourn the master dead and then
The new one welcome and obey;
We soon forget, if he is kind,
The virtues of the kindly dead—
We do not mourn the years behind
If hope lies in the one ahead.

Simply naming the automobile you build and claiming it to be superior to others is mere publicity. Real advertising asserts and then seeks to prove by sound reasoning. The automobile public's "whys" have got to be met with plenty of "becauses."



INVENTORS are never idle and scarcely a week passes which does not witness the launching of some new and in some cases useful automobile device. Manufacturers are on the alert for any new ideas, and the inventor with a practical idea does not have to go begging for a buyer. His wares are eagerly snapped up at a fair price and his services are in demand. Among recent things which may or may not be good is a muffler by which the lost heat from a motor is converted into electricity. According to the inventor only 18 per cent. of the heat units generated by a motor are transformed into power. Of the remaining 82 per cent., 65 per cent. is carried away by the cooling water and the remaining 17 per cent. escapes through the exhaust. It is this 17 per cent. which my friend the inventor thinks he has corralled and from it he claims to have secured a current strong enough to be stored away in an accumulator to assist with the ignition or to make a headlight. Maybe he has; I don't know.

Good automobilists as well as bad have to carry their license numbers prominently displayed on their vehicles, according to the law, so when the drivers exceed the speed limit the policemen, if they cannot catch the offender, can see the number and locate the owners of the vehicles. One of the new ideas to aid the policeman in doing all this is to wipe the number plate with a piece of oily waste, whereupon it is not long before the dust is so thick on the oily plate that it is impossible to read the number. One driver recently told me of this trouble, "and," said he, "if I am stopped and told that the number cannot be read, why it is the easiest thing in the world to wipe it off, and always use waste with plenty of oil on it. This will save lots of trouble."

No matter what any one says about "the season" for advertising automobiles, I tell you the best plan is to keep advertising all the time. If the manufacturer can give his advertising the time it should have he had better make it the duty of some one of his assistants to attend to this branch of work. Let the assistant have a certain time each day for the work, and have it understood that this work is to be done as carefully and as regularly as any other duty. Do this the year around and there'll never be any doubt as to the results being satisfactory.

SECRETARY JAMES L. COWLES, of the Postal Progress League, has had put into print his vision of a Postal Utopia which shall have its great center in New York. In his mind's eye he sees automobile post-offices traversing the metropolitan streets, receiving and giving out mail as they go. He sees a light and swift motor vehicle service carrying letters and light parcels; a heavier outfit taking care of packages even as big as barrels. Letters and parcels alike are to go straight from starting-point to destination in the least possible time. This is a wonderful dream of progress. It inspires thoughts of a time when in fastest New York it may be possible, as it is even now in slowest

London, to mail a local note and get the mailed reply all in the same afternoon. A wonderful dream, indeed. And yet, considering all the up-to-date facilities for swiftness the automobile undoubtedly affords, one is moved to ask, "Why not?"

Paris has tried very nearly the same thing on a fairly extensive scale and with highly satisfactory results. The French experiment was the moving of its mail matter about the city between main and branch post offices in big vans propelled by electric motors instead of being drawn by horses. The motor vehicles carry much more than those they replaced, and they travel so much more rapidly that the hours for distributing and collecting mail can be arranged in better accord with public convenience. The new system has been proven of special advantage for reaching the outlying posts. The speed within the city has been shown under service conditions to be about fifteen miles an hour, which exceeds the contract speed considerably.

At present the postal service of Paris uses 600 horses. The fifteen automobiles which are now running will supplant forty horses to begin with, as they replace twenty of the old cars out of the 125 which were used. The authorities think that the new cars will give an economy in money as well as in time, since the cost of keeping city horses is large. City horses, however, cost much more than their "keep," and much indirect profit should be credited to any device that decreases their numbers. Street cleaning becomes a task comparatively easy when horses are banished, and that of protecting the public health is vastly facilitated by their absence. New York was never proud of its mail wagon horses, and would be delighted to bid them all a grateful farewell. So as I have said I can see no valid reason why American mails should not be quickly, economically, and above all, humanely moved by the horse power begotten of an engine in place of beaten from a half-starved, half-dead animal whose only crime is his uncomplaining willingness to die for those who abuse him.

OCCASIONALLY you read of a man who has so much money he cannot spend it. I never could imagine myself in any such position, because I know such an absolutely certain remedy for this condition of affairs—take a few cab rides in New York and the bill you will have to pay for the "pleasure" will take all the money you have, no matter how much it may be. Among the many other evils that the coming of the automobile is bound to correct is this: Sooner than most people expect the hay-motor pirate will be a thing of the past. Already in Paris the beginning of the end is in sight. Along the boulevards, just like ordinary cabs, are now to be found quite a number of first-class automobiles, as spick and span, and as modern as any private car, which anyone who is desirous of going off for a day, a half a day, or even an hour's automobile run, can engage for the trip. The cars are generally driven by experienced chauffeurs who appear usually to be the owners of the vehicles as well as their drivers, and their politeness to customers forms an agreeable contrast to the offensive demeanor which is a characteristic of the

Paris cabby no less than of his New York *confrère*. Considering what you get and the fact that anything having the word "automobile" in any way connected with it is always supposed to be expensive, the tariff of these vehicles is not high since one capable of seating four persons can be had for $4 for the first hour and $2 for each succeeding hour, and from $8 to $12 for the half-day.

NO one would ever think it after seeing how many ingenious methods those whose pleasure and profit it is to legislate against automobiles and their owners have resorted to to mulct these perambulating good things, but still the fact is that the American mulcters are away behind their foreign bretheren in devising new ways to accomplish their ends. Take Germany, for instance, and there you will find that, according to a law passed in 1901, the owner of an automobile can be punished for allowing his car to give off too great a smell of gasolene. A German automobilist who must have been of the rara avis kind, since he fought, was fined for this offense recently and appealed to a higher court. Eventually it was decided that punishment for such an offense could only be meted out "when the smell of the gasolene is so great as to force passersby to take another road to that used by the automobilist in question." Of course this decision shows a lamentable weakness in the German law, which we can safely rely upon the motorphobic originators of it to quickly correct, but even so, the idea of the law is evidence of a very much higher ability to annoy automobilists than American motor phobes have yet shown. Give the latter a chance, though, and you'll soon see how they'll beat the foreigners in this like other games, for are not the very finest specimens of the pot house and potato field politicians in this glorious land of the free devoting their great talents and abundant time to the one great question of "What shall we do next to the automobile?" Certainly they are, so what chance has any grafter got to beat them?

EVERYONE seems to have the owner of an automobile marked down as a good thing these days. Magistrates, judges and 'squires, lecture, fine and admonish them; policemen, constables and officers arrest them; hoodlums stone them; "funny men" lampoon and deride them, while all hands join in an effort—too often successful—to chadwickize them. So used has the automobilist grown to having every man's hand against him and into his pockets that even the hobo, despised and derided as he is by all the remainder of mankind, has seen the softness of the game and got into it. Over in New Jersey the frowsy disciple of Robin Hood has recently taken to organizing fake courts at the road side before which alleged scorchers are haled by alleged constables and made to pay fines for alleged fractures of the speed ordinances. Verily, when it has come to such a pass that the automobilist will allow himself to be held up by even the Weary Willies of the highways, it seems to me we have arrived mighty close to the stepping-off place, and out of sheer desperation the automobilists should cease to be sheep in the hands of the shearer, and become men in defense of themselves and their rights.

NEVER knew I had so many friends as the last month has developed. People I hardly knew by sight have slapped me on the back, called me by my given name and evinced a most charming interest in my physical, mental and financial welfare. Others whom I have known in a manner none too flattering to them have suddenly become almost overpowering in their desire to take the management of certain affairs out of my hands for fear that the strain of my continuing without their help might prove too much for me. Of course it would flatter me to see how popular I had suddenly become among those who barely know I am alive the remaining eleven months of the year did I not remember that the date of the Ormond-Datona races is less than a month away. See the connection between this and this sudden flood of new born anxiety about welfare ability to struggle under the load alone, etc.?

I AM thoroughly in accord with what Mr. Trenholme says in the last issue of THE AUTOMOBILE MAGAZINE anent the desirability of our quickly arriving at something definite as to the methods of measuring the horse power of the motors used in an automobile. Now I had always thought that even in an automobile one horse power was the equivalent of 33,000 pounds raised one foot in one minute, but evidently I belong to the old school, because I read in an advertisement of a Detroit automobile in a recent issue of *McClure's Magazine* that a horse power according to this new authority is the power required "to lift 33,000 pounds one foot per hour." Imagine the speed and pleasure the buyer of this Detroit automobile will have if that is really the way the builders of the Detroit vehicle measure the horse power of the motors they install. Or what do you think will be the intelligent reader's opinion of a concern which calls attention to its wares with such absurd statements as these?

JUST while I am on this subject of the automobile trade's advertising I want to say a word or two about the way some very valuable space and effort is thrown away by those who believe they know how to write advertisements of automobiles or their equipment in such a fashion as will bring returns sufficient to warrant the writers of the advertisements continuing to hold their positions. So far as I personally go I have no patience with the "smart" or "catchy" ad. Advertising at its best merely tells people a story that they can understand. It eliminates all technicalities, and really tells what people really want to know. This does not mean childishness in words of one syllable. It simply means plain language, such as ordinary people are accustomed to. There isn't a trade or a business under the sun that has not a lot of expressions known perfectly well to those engaged in that trade, but without meaning to those not in that particular business. A printer talks about "shooting sticks" and "slugs" and "planers;" he talks about

"making fat," about "justification," "under-lays," "over-lays," "tympans," and fifty other things that every printer knows all about, and which are comprehended by not one person in a thousand outside of the printing trade. In every other line of business that I know anything about there are words and phrases equally unintelligible to outsiders.

I suppose all of you have read "Mark Twain's" account of Buck Fanshawe's funeral. Mr. Scotty Briggs and the new preacher talked to each other for an hour or more without either one understanding much of what the other one said. What they needed between them was an interpreter—a man who could take the technicalities, or the slang, or the unusual words from one man and translate them into language that the other man could understand. That is what is needed in almost every business under the sun, including the selling of automobiles. The interpreter needn't be funny, and he needn't be cute, he needn't be original. His business is to make a message that will be intelligible to the great mass of people outside the business he is writing about, and to whom the writing must of necessity be addressed.

If advertising really tells about the goods or those who make them so that people understand and appreciate, that is all that it can do. If the manufacturer is right and the goods are right, that is all that it is necessary to do. That kind of advertising will sell any goods that ought to be sold. It is simply a question of reaching the people with definite, adequate knowledge. Advertising is profitable, or not, in the degree to which this is accomplished. If you meet a man on the street and tell him what you have in the way of an automobile, a part or an equipment thereof, so that he understands just what it is, and why it is good, that is good advertising. If you put the same talk into a publication, and it reaches ten thousand people, and conveys the same ideas and impressions to them, that is good advertising. If a sufficient proportion of these people need or desire what you have to sell, it will be profitable advertising.

It is possible for advertising to create a demand. Generally, the demand exists before the advertising. Generally, advertising merely tells where the demand can be supplied. Advertising that creates a demand, merely tells people of some want that they didn't know they had. It makes them wonder how they ever possibly got along without that particular thing. It tells what the thing is, and its uses and advantages. The more perfectly the advertising reflects the goods and the spirit of the advertiser, the better advertising it is. If it misrepresents by reason of either inadequacy or exaggeration, it is bad advertising. If it doesn't show the goods as good as they are, it is bad. If it shows them better than they are, it is perhaps even worse.

GOING along a busy street leading to one of the most-used ferries in the down-town district recently I was surprised to see in the window of a machine shop this sign: "Lathe work day or night." I went in and interviewed the proprietor, who told me that this means that the shop is ready for any sort of work at any hour—ready

to make repairs in case of emergency. Furthermore he said there are now perhaps half a dozen such concerns as his in the city that hold themselves in readiness to make machinery repairs at any hour in the twenty-four. The physician has, at all times, been ready to answer calls. The drug store night bell is familiar, and, in these days there are many drug stores that are open day and night. A modern night bell is that of the plumber, who keeps a man in his shop to answer night calls, or posts his night address there. In one place in this city, down on the waterfront, you will find the night bell of a wrecking company, where a relieving outfit can be summoned into prompt action. Newest among these emergency workers who may be summoned at any hour is this machinery doctor, who, like the curer of human ills, can be called up at any hour, day or night, to cure ailing machinery and among whose patients not the least remunerative or infrequent are the owners of automobiles, who, when the breakdown wants quick attention regardless of what it costs them.

JUST a vagrant thought, but a timely one at that: When power-drawn vehicles shall have superseded horse-drawn vehicles entirely, as, no doubt, in the not far distant future they certainly will have done, what will become of the grand marshal? Will anything be devised that will enable him to shine with anything like his present glory?

Now, with a broad, bright-colored sash worn diagonally across his manly bosom, and with a dahlia-like rosette pinned upon his breast, he rides grandly at the head of the procession mounted on a horse. What would a procession be without a grand marshal, and what would a grand marshal be without a horse? And what will he do when there are no horses?

His prospect now is dim, indeed; but let us hope that, when the motorific age shall actually have come, some means will be found to preserve the glamour and the glory of the grand marshal. Can you tell me?

If all of motoring should love me,
How full were sorrow's cup!
The cash I spend at Christmas
Would simply break me up.

A FEW years ago Winthrop E. Scarritt bought a French machine. It was the custom then of the members of the Automobile Club of America to buy their machines abroad, leaving the American infant industry of automobile making to the encouragement of those who did not know so much about automobiles as A. C. A. members did. In other words it was the plebeian and the uninformed who had to foot the bill of the American manufacturer, though I am glad to notice that now many of the gentlemen of the Automobile Club of America are living up to their club's title, and buying things American.

Mr. Scarritt told me a story about this first experience of his with a foreign machine, which is well worth repeating. He haunted the Custom House and the steamship lines until he got hold of that machine. When he finally did get it his pleasure at possessing it was tinged with some fear as he saw the multitude of parts in the foreign one's make-up. He at once concluded that he would take the vehicle up town

and place it over a pit so he could study the intricacies of its mechanism. He did this, and descended into the regions below. Grasping a lamp, he looked up, and, to his mind, no heavenly constellation was ever more beautiful or more complicated than the works of that machine. He sat down in the pit and pondered and solemnly vowed that the first man who came along with a check-book and had the price should get that machine, as there were too many parts in it for a man who favored the simple life as he did. On coming out of the pit all covered with oil, the first man to rush into the garage was his bosom friend, Harlan W. Whipple, who instantly began bemoaning his fate because the new importation was not his property. "Well, Whipple," said Scarritt, "you are my best friend, and as you want this machine so badly, and you have the price in your pocket-book, you shall have it." Whereupon, the overjoyed Whipple produced the book and wrote out a fat check, and the machine instantly changed ownership. Mr. Scarritt hurried to catch his train for his East Orange abode, where he communed with himself and wondered what happened to Whipple when he turned that machine loose on the Jersey meadows.

A friend of mine who has what he considers more than his fair share of reckless, but not wreckless, chauffeurs, has, to save himself, a lot of bother in connection with new applicants for a position, had a few leading questions typewritten and to the applicant he submitted these with the request that they be answered in writing. One of the most important of these questions was, "Do you ever use liquor?" In answer one candidate wrote, "Not to success," which put him out of the running entirely.

IF ever there was a lusty infant the New York Motor Club is it. Energy and ingenuity are combined in the efforts of its officers to advance the club along safe but progressive lines. As an excellent example of the cleverness the club officials show even in minor details, take the illustration at the beginning of this. I reproduced that from one corner of a card which followed me to Havana recently in a laudable endeavor on the part of the United States postal authorities to let me know that the New York Motor Club was going to have some sort of a blow-out. As the affair was to be a smoker, I think, you can see how the artist made a motor car pose as "a puffing Billy," though confidentially, just between ourselves, do you know I think this smoking motor game is one we had best let our friends, the enemy, dilate on. They are sure to do it, any way, and a smoking motor is almost as bad as a smoking office-boy, and you know he's the limit.

Following the sunshine of to-day comes the gloom of the morrow. With the glad tidings of the holiday season ringing in his ears, our Mr. Sinclair has had to listen to the tolling of the bell that marked the passing away of his brother Donald, a civil engineer of unusual ability. Donald Sinclair was president of the Sinclair Construction Company, a corporation which was largely instrumental in constructing the famous Chicago drainage canal.

THE SENATOR.

LOZIER

IN the matter of correct mechanical construction, the name "LOZIER" sticks out so prominently that in the building of Automobiles it is certain to make an unquestionably strong impression as to what a thoroughly reliable and up-to-date Motor Car should be.

LOZIER high grade Motors and Motor Boats have long been famous and "top-notchy," and we therefore bring into the Automobile field a well merited reputation for doing all things well.

The TRADE generally has known that for the past twenty-three months we have been working out our Automobile ideas, and it gives us pleasure to announce at the beginning of the New Year

"The Lozier Motor Car"

We have in preparation our Motor Car Booklet, and would be glad to enter your name for a copy, or furnish you with advance information.

MOTOR BOAT AGENTS
are requested to write us for our MOTOR BOAT discounts

A LOZIER MOTOR CAR, 30-35 H. P.

THE LOZIER MOTOR COMPANY
1 Broadway, New York City
Dept. A2

INDEX TO ADVERTISERS

	PAGE
Acme Motor Car Co.	78
American Darracq Auto. Co.	3d Cover
American Motor League	29
Atlantic Coast Line	30
Badger Brass Mfg. Co.	18
Baker Motor Vehicle Co.	4
Century Camera Co.	7
Chicago Battery Company	12
Clyde Line	14
Continental Caoutchouc Co.	77
Dewar, John, & Sons	28
Dieges & Clust	78
Duff Manufacturing Co.	7
Duryea Power Company	15
Dyke, Dr. A. L.	76
Eastman Kodak Co.	72
Electric Contract Co	13
Electric Vehicle Co	24
Fischer, J. & C.	13
Fisk Rubber Co.	76
G & J Tire Co.	15, 27
Glassup, Frederick	28
Grand, W. D.	74
Hartford Rubber Works Co	2d Cover
Hollander & Tangeman	80
Information Bureau	16
Jeffery & Co.	75
Knox Automobile Co.	29
Locomobile Company of America	6
Lozier Motor Co.	70
Madison Square Auto Show	18
Motor Car Supply Co.	5
Motsinger Device Manufacturing Co.	74
National Sportsman	26
National Motor Boat and Sportsman's Show	30
New York and New Jersey Lubricant Co.	72
Olds Motor Works	25
Ormond-Daytona Beach	2
Packard Motor Car Co.	21
Pierce Company, George N.	10
Pope Motor Car Co.	17
Prescott Automobile Mfg. Co.	76
Rambler Automobiles	75
Reid Manufacturing Co	31
Roberts, E. W.	3
Royal Motor Car Co.	19
Rubay, Leon	5
Seaboard Air Line Railway	26
Southern Railway	79
Sprague Umbrella Co.	32
St. Louis Motor Carriage Co.	22
Stevens Arms & Tool Co.	4th Cover
Storage, Repair and Charging Stations	3, 5, 7, 9, 11, 13
Swinehart Clincher Tire & Rubber Co.	22
Synnestvedt Machine Company	30
Thomas Motor Co., E. R.	20
Union Automobile Co.	9
Waltham Manufacturing Co.	8
Wayne Automobile Co.	73
White Sewing Machine Co.	23
Whitney Manufacturing Co.	20
Willis Co., E. J.	31
Worthington Automobile Co.	Front Cover

Non-Fluid Oils

Lubricate Without Dripping and Wasting Like Fluid Oils Unlike Greases, Do Not Gum Up Bearings and Decrease Mechanical Efficiency of the Engine.

Will reduce your lubricating expense largely; insure most efficient service from your car; and keep repair bills down to a minimum.

Ask Your Dealer or Send to Us for Free Sample.

N. F. O. Auto Lubricant Gun

1905 Model

Fills a long-felt want, for conveniently and economically applying lubricants in the transmission or other hard-to-reach parts. **Can be operated with one hand,** which saves crawling under the car.

Will soon return its cost in oil saved, and last a lifetime.

Ask Your Dealer or Write Us for Circular.

NEW YORK AND NEW JERSEY LUBRICANT COMPANY, 14 and 16 Church St., NEW YORK 79 Ninth St., SAN FRANCISCO

[See Us at the New York Show, Block "U," Main Floor, Elevated Platform]

Proof of the complete success of the

KODAK DEVELOPING MACHINE

lies in the fact that it is now in every day commercial use and those establishments which have adopted it are getting an improved quality of work. Machine finished negatives are free from finger marks and other blemishes.

KODAK DEVELOPING MACHINES, $2.00 to $10.00.

Kodak Catalogue Free, at the dealers' or by mail.

EASTMAN KODAK CO.
Rochester, N. Y.

SPECIAL 1905 OFFER

Library of American Fiction — 10 Volumes, Richly Bound 16mo, Nearly 2,000 Pages

With One Year's Subscription to

Success AND TO **The Automobile Magazine** ALL THREE FOR ONLY **$4**

THE AUTOMOBILE MAGAZINE

Book Department — *136 LIBERTY STREET, NEW YORK*

The WAYNE CARS

Model "C"

Price $1250

The Wayne Model "C" is a five passenger touring car, 16 H. P. double opposed motor, planetary transmission, 90-inch wheel base, double side entrance tonneau, in fact a $2500 car in everything but price.

The motor and flywheel are hung under the chassis frame, making the center of gravity low. This improves the running of the car, giving stability in turning corners, and by decreasing skidding on the curves lengthens the life of the tires, so that the expense of running the Wayne is less than any car of similar type.

Model "A" has practically the same mechanical construction as Model "C" except that the tonneau has a rear entrance and is detachable, enabling this model to be used as a runabout, if desired. **Price, $1200.**

Seven years' hard labor has been spent in developing and perfecting the Wayne cars, and this alone assures purchasers of freedom from many troubles found in new and experimental designs.

The Wayne Model "B" Four-Cylinder Touring Car will be the talk of the Show. 24-28 H. P., bevel gear, direct drive, sliding transmission, wheel base 102 inches, side entrance tonneau, weight 1550 lbs. **Price $2000.** This car has fewer parts than any four cylinder automobile made.

NEW YORK SHOW—Space C. **CHICAGO SHOW—Spaces 107-108**

We shall be glad to demonstrate the merits of our cars at the New York and Chicago Shows, or to send our catalogue to those who appreciate quality and reliability at a moderate price. Will you write us to-day?

We have some good territory open for Live Agents and have an attractive proposition to make if you will write us at once.

The Wayne Automobile Co., Dept. R DETROIT, MICH.

NEW YORK AGENCY—Wayne Auto Agency, 308-310 W. 59th Street
CHICAGO AGENCY—McDuffee Auto Co., 1449 Michigan Avenue
BOSTON AGENCY—Walter C. Masters, 14 and 16 Columbus Avenue

Automobile Calendar for 1905

An exceptionally artistic picture of a woodland scene and an automobile party, painted by Mr. Arthur T. Merrick and reproduced in three colors. The calendar is one which will prove an ornament and a convenience for the ensuing three hundred and sixty-five days. Sent anywhere upon receipt of ten cents for mailing, etc.

Book Department

AUTOMOBILE MAGAZINE

136 Liberty Street **NEW YORK**

If you want to sell your automobile
send for entry blank

If you want to buy an automobile
send for catalogue

THE GREATEST OF

W. D. GRAND'S

Auction Sales of Automobiles

will be held on January 20th

The week of the two automobile shows in New York City

The sale will be held in

The American Horse Exchange
(The finest sales ring in the world)

Broadway and 50th Street **New York City**
Right at the 50th Street Subway Station

For all information, entry blanks and catalogues, address

W. D. GRAND, Auto Dept.
American Horse Exchange
Broadway and 50th Street, New York City

FOR SALE

Panhard Automobile, 16 horse-power, phaeton body, 1902 model, with Krebs carbureter. In first-class condition. Price $3500. Address J. L. M., this office.

To Owners of Gas and Gasoline Engines, Launches, Automobiles, Etc.

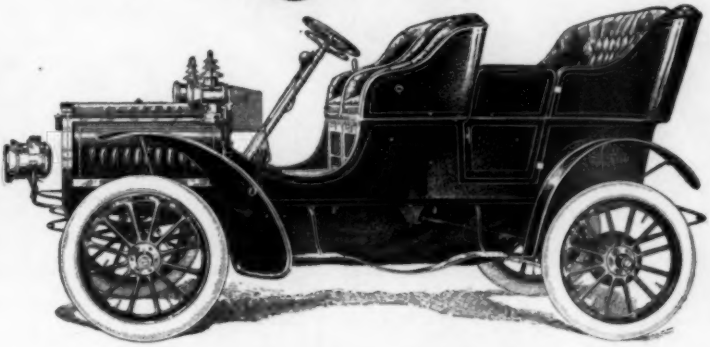
Do away entirely with ALL starting and running batteries and their constant trouble and expense by using instead an

Auto-Sparker.

No belt—no switch—no batteries. Can be attached to any engine now using batteries. Fully guaranteed and costs less than 50 cents per year to operate.
Write for descriptive booklet and testimonials.

MOTSINGER DEVICE MFG. CO.
38 Main Street, Pendleton, Ind.

Rambler



Rambler Surrey, Type One, 1905 Model
2 cylinders, 16 actual horse power, $1350
Other models $750, $850, $2000, $3000

We temper our claims to horse power with such moderation, that when out on rough roads and over the hills, one may have absolute confidence in the propulsive energy and endurance of the vehicle he drives. Send for "The Rambler Magazine" and other printed matter.

Thomas B. Jeffery & Company
Main Office and Factory, Kenosha, Wisconsin
Branches, Boston, 145 Columbus Avenue, Chicago 304-6 Wabash Avenue, Philadelphia, 242 North Broad Street. New York Agency, 134 West Thirty-eighth Street. Representatives in all leading cities

1905 Will be the "Mechanically Fastened Year"

WHY?

The Success of that Tire

The manner in which it has solved the tire problem and reduced the troubles and the cost of tire maintenance simply has compelled acknowledgment.

Success Always Begets Imitation

The FISK was first; it is still in front. It is the only mechanically fastened tire that actually has stood the test of time. It has left off where the others are but just beginning.

The Fisk Rubber Company

CHICOPEE FALLS, MASS.

BRANCHES:—New York, Buffalo, Syracuse, Philadelphia, Boston, Chicago, St. Louis, Minneapolis, Omaha, Detroit, Denver, San Francisco.

Have You Read Dr. Dyke's Books?

Dr. Dyke, Specialist in Diseases of Gasoline Autos

This is a Personal Question Intended for You

Order them; if you don't like them I don't want you to have them.

DR. DYKE'S "**Anatomy of the Automobile,**" **$2.50.** 700 pages Shows construction and "How to Operate" all leading American made autos Fully illustrated with detailed drawings—also explains a few foreign cars.

Detailed drawings and descriptions of all airships exhibited at World's Fair.

Another book is DR. DYKE'S "**Diseases of a Gasolene Auto and How to Cure Them.**" 225 pages of Hints and Suggestions for the Owner, Repairman. 5000 copies of this book already sold, and not one dissatisfied customer.

Price, $1.50

DR. A. L. DYKE

AUTO SUPPLIES

Originator of the First Auto Supply Business in America. Est. 1899

Engines 1 to 4 cylinder, 4 Cylinder Air Cooled Engines, Marine Engines, 12, 16 and 20 h. p. Chassis from $750 to $1075

311 Pine Street, St. Louis, Mo.

1905 PRICES 1905

From $650 to $900

According to Construction

PRESCOTT

A steam automobile which has been proved of superior worth. It is especially adapted for doctors' uses. Quick to get ready; absolutely safe; speedy; will not freeze up; no hand pumping; has a patent vaporizing device for "firing up." Built for 2 or 4 people. Has a folding front seat.

At the hill climbing contest at Eagle Rock, N. J., the 8800 PRESCOTT was but 2-5 seconds behind an $8000 French car, and was 10 2-5 seconds ahead of a $2500 car.

40 H. P. Decauville (gasoline), 1 m. 37 1-5 sec. 7½ H. P. PRESCOTT (steam), 1 m. 37 3-5 sec. 15 H. P. White (steam), 1m. 48 sec.

See our exhibit at New York, Buffalo and Boston Shows

PRESCOTT AUTOMOBILE MFG. CO.

90 West Broadway, New York

A Good Car Equipped with CONTINENTAL TIRES Has a Great Advantage Over Cars Not So Equipped

C. C. & C. P. Co. H.

Madison Square Garden AUTOMOBILE SHOW January 14-21, 1905 Spaces 20 and 21 "At the Top of the Heap"

CONTINENTAL
CONTINENTAL
CONTINENTAL
CONTINENTAL
CONTINENTAL
CONTINENTAL
CONTINENTAL
CONTINENTAL
CONTINENTAL
CONTINENTAL
CONTINENTAL
CONTINENTAL
CONTINENTAL

Awarded GRAND PRIZE Louisiana Purchase Exposition SAINT LOUIS 1904

C. C. & C. P. Co. H.

CONTINENTAL CAOUTCHOUC COMPANY 298 Broad'y, New York Emil Grossman, Gen'l Mgr. Factory, Hannover Germany

The ACME OF PERFECTION

FOR 1905

Type 9 Runabout. Price $800

Single Cylinder. Vertical Motor, 8 H. P.
Three Speeds, Forward and Reverse.
Ball Bearing Sliding Transmission.
Bevel Gear Drive.
Governed Engine Automatic Carbureter.
Weight 1100 lbs.

Type 10 Runabout. Price $1000

Two-Cylinder Vertical Motor, 16 H. P.
Three Speeds, Forward and Reverse.
Ball Bearing Sliding Transmission.
Bevel Gear Drive.
Governed Engine Automatic Carbureter.
Speed, 45 miles per hour.
Weight, 1200 lbs.

Type 6 Light Touring Car Price $1650

Two-Cylinder Vertical Motor, 16 H. P.
Three Speeds, Forward and Reverse.
Ball Bearing Sliding Transmission.
Double Chain Drive to Solid Rear Axle.
Governed Engine Automatic Carbureter.
Detachable Tonneau. Seats 5.
Weight 1900 lbs.

Type 8 Touring Car. Price $2750

Four-Cylinder Vertical Motor, 16 H. P.
Four Speeds, Forward and Reverse.
Ball Bearing Sliding Transmission.
Double Chain Drive to solid rear axle.
Governed Engine Automatic Carbureter.
Double Side Entrance Tonneau.
Magneto Ignition.
Folding Cape Cart Top.
Speed, 45 to 50 miles per hour.

A very interesting proposition, with photos and detailed description of all our cars will be mailed to agents in unoccupied territory. The easiest selling line in America. Better write.

ACME MOTOR CAR COMPANY, Reading, Pa.

DEVLIN & CO.
No. 1407 Michigan Boulevard, Chicago, Ill.
Western Distributors

WE WILL EXHIBIT AT
NEW YORK AND CHICAGO
SHOWS

DIEGES & CLUST

GOLD and Silver Smiths

25 JOHN STREET

Automobile Medals and Trophies

A SPECIALTY

Automobile Races ORMOND FLORIDA

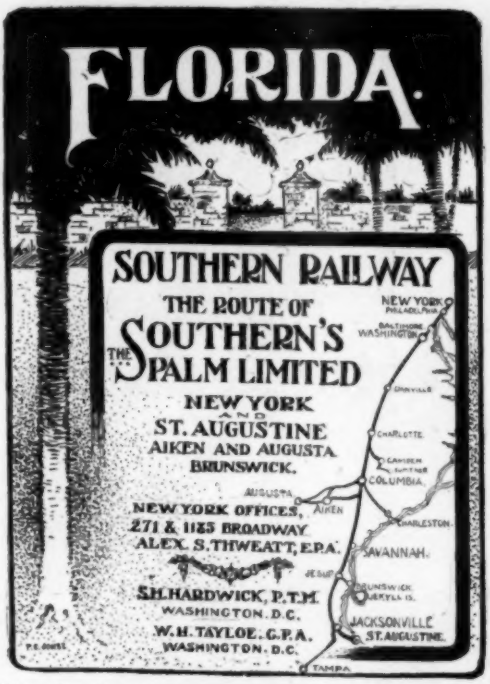
SOUTHERN RAILWAY, The Popular Route

2 Fast Trains Daily

Pullman Drawing-Room, Sleeping Cars, Southern Railway Dining Car, the highest standard of excellence. Inaugurated January 9th, 1905, and daily except Sunday.

THE SOUTHERN'S PALM LIMITED

In its *ensemble* this train most nearly approaches an in every way up-to-date modern hostelry on wheels. Pullman Compartment Cars insure privacy in richly upholstered and artistically finished and decorated apartments having every convenience of toilet and other appointments. The Drawing-Room Sleeping Cars are luxuriously and richly furnished and have drawing-rooms in addition to capacious toilet accommodations, so that the single night *en route* may be passed as comfortably as at home or in the best hotel. A handsomely furnished Library Car, with its easy chairs and sofas, writing-desks supplied with exquisitely engraved stationery and the latest papers and magazines, reminds one of the reading-room of a modern club. In the Club Car is a capacious smoking-room, a buffet, a barber-shop and a fully equipped bathroom. The Dining Car, with its silver, fine linen and cut glass, will delight the most exacting epicurean as he sips his green turtle soup and eats his lobster *à la* Newburgh or diamond-back terrapin *à la* Maryland. And from the plate-glass sides and end of the Observation Car, at the rear of the train, the traveler looks out upon scenes repiete with historic and romantic interest as he is whisked down through the Sunny Southland.



For further information call on or address any of the following agents of the Southern Railway:

A. S. THWEATT, Eastern Passenger Agent, 1185 Broadway, New York; C. C. THORN, Passenger Agent, 271 Broadway, New York; L. S. BROWN, General Agent, 705 15th Street, N. W., Washington, D. C.; C. L. HOPKINS, District Passenger Agent, 828 Chestnut Street, Philadelphia, Pa.; GEO. C. DANIELS, New England Passenger Agent, 228 Washington St., Boston, Mass.; S. E. BURGESS, Traveling Passenger Agent, 317 N. Charles St., Baltimore, Md.

S. H. HARDWICK, Passenger Traffic Manager
W. H. TAYLOE, General Passenger Agent
} Washington, D. C.

"The Aristocrat of Auto Cars"

F·I·A·T

THE illustration above shows William Wallace, Esq., in his 90 H. P. "FIAT," which won the Free-for-all Stock Car Race at Eagle Rock.

The "FIAT" Car, owned by Alfred Gwynne Vanderbilt, Esq., and driven by Sartori, was second, and E. Cedrino, in a 60 H. P. "FIAT," was third.

The "FIAT" Cars made the best all around showing and most consistent performance of the day.

HOLLANDER & TANGEMAN

5 West 45th Street, N. Y.

Sole American Agents — Licensed Importers under Selden Patent

Mr. Alfred Gwynne Vanderbilt's 90 H. P. "FIAT" Car holds the World's Record for road racing, having covered 240 miles at the average speed of 72 1-5 miles an hour, without a stop, at the Brescia Race.

Average speed of Gordon Bennett winner, 57 miles an hour
Average speed of Vanderbilt Cup Race winner, 52 miles an hour